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ABSTRACT

The National Commission for Employment Policy estimates that 19 million workers--17 percent of the work force--are in jobs directly threatened by office automation, and the consequences of the displacement of clerical workers due to increasing office computerization are as serious as those from manufacturing job loss. Between 1983 and 1988, almost half of displaced workers in the United States came from the service sector. Women, minorities, and older workers fare far worse than others. To prevent clerical dislocation and to mitigate turbulence from labor-saving technologies, the following policies must be adopted immediately: (1) a massive retraining effort targeting women clericals must be undertaken to upgrade workers for the relatively high-growth technical and professional positions; (2) private employers must retrain their current personnel rather than raise hiring standards and then hire externally for upgraded positions; (3) the federal law requiring early notification of impending layoffs must be extended to cover smaller companies or departments within companies; (4) union contracts must include job security clauses that guarantee employment over the life of a contract even in the face of automation and that guarantee replacements for significant numbers of positions now left vacant; and (5) the private and public sectors must fund more job retraining, worker upgrading, and adult education programs in conjunction with local education agencies. (247 references) (CML)

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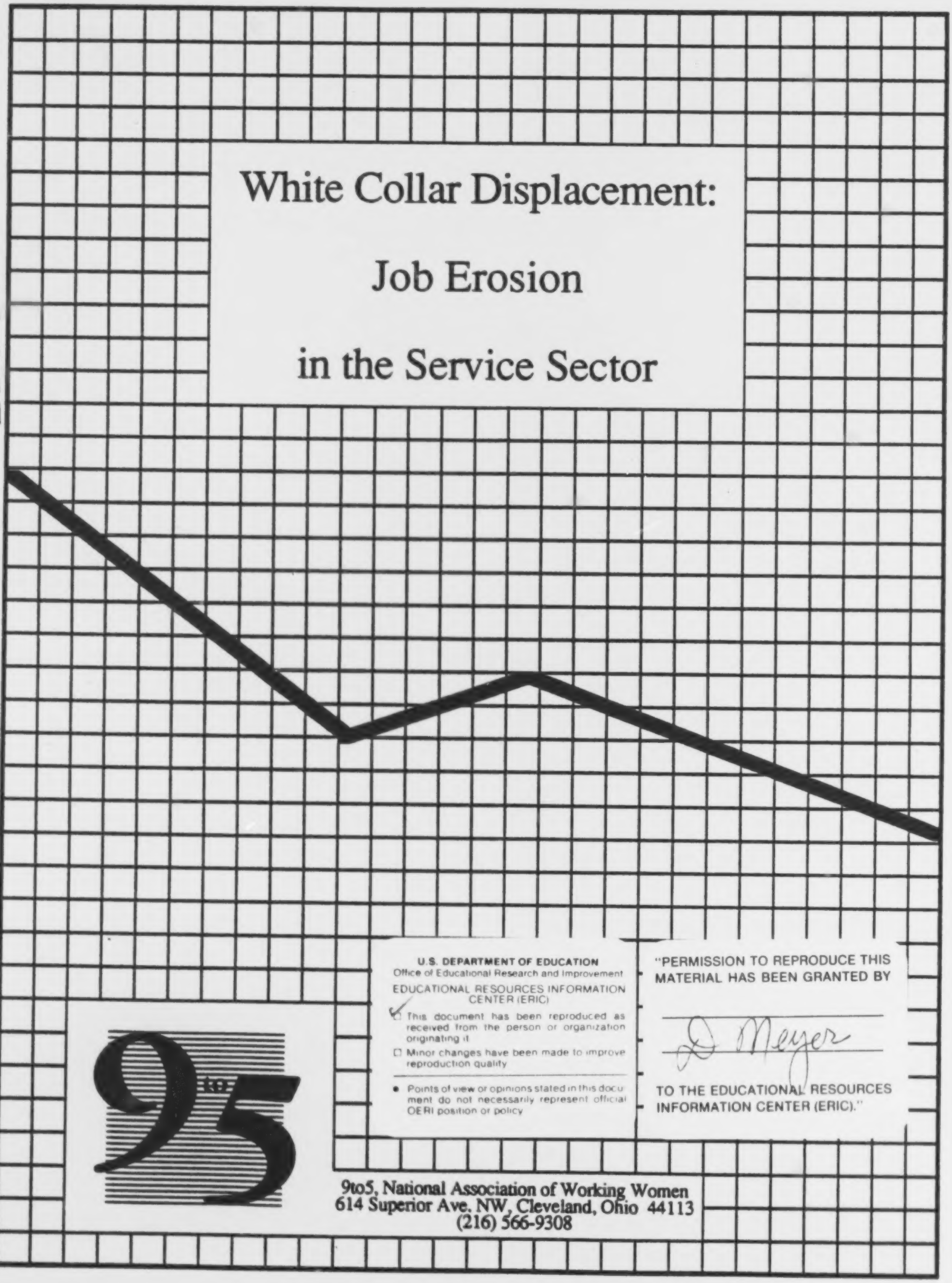
White Collar Displacement: Job Erosion in the Service Sector



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WHITE COLLAR DISPLACEMENT:

JOB EROSION IN THE SERVICE SECTOR

9to5, National Association of Working Women is a membership group of office workers which combines research, education, and activism to win better working conditions -- rights and respect -- for the nation's 20 million office workers.

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EXECUTIVE SUMMARY

Introduction

Americans are familiar with manufacturing job loss and its effects: the interruption of careers, the trauma to families, and the impact on communities. These layoffs are highly visible.

Displacement of clerical workers threatens to have equally serious consequences, yet it is largely hidden and undocumented. While productivity increases from computerization are welcome, this report focuses on the resulting clerical displacement.

> Displacement is permanent loss of a job held for at least three years through plant closing or relocation, slack work, or the elimination of a position or shift.

Technology threatens jobs in both factories and offices. Between 1983 and 1988, 13.3 million additional jobs were created and the workforce expanded by 9.7 million. This period of job growth -- widely hailed as an economic recovery -- masked a tremendous amount of hardship and upheaval: during the same period 9.7 million workers aged 20 and older permanently lost their jobs during the same period. The largest portion of displacement occurred -- and still occurs -- in the service sector.

Displacement from Automation

Displacement is facilitated by computerization. New computer technologies are quietly eroding whole strata of clerical jobs. The National Commission on Employment Policy estimates that 19 million workers -- 17% of the total workforce -- are in jobs directly threatened by office automation.

The clerical work force -- over 80% of whom are women -- is the most vulnerable to displacement; with computerization employers either eliminate many jobs, or upgrade the jobs' skill requirements without training or retraining their workforce. The result is that clerical workers are often pushed out or restricted to low-skill, lower paid positions, instead of being brought up to the higher skilled, higher paid positions.

Financial Growth Does Not Necessarily Mean Job Growth

Growth in service occupations will no longer be able to pick up the slack left by job loss in the manufacturing sector, because employers often substitute computers for clerical and other service-producing employees.

Technological advances now permit many firms -- and entire industries -- to experience financial growth and expanded volumes of business **without** a corresponding growth in employment.

- A shopping center management company, Spatz and Company, handled four properties in 1981 with three bookkeepers. By 1987 the company managed 65 properties with only one more bookkeeper. According to the president of the company, if they had not acquired a mainframe computer Spatz would have needed an additional 16 bookkeepers.
- A Medicare department of Blue Cross/Blue Shield of Canada had a staff of 127 which processed 830,000 claims in 1976. In 1981, 1.4 million claims were processed without an increase in staff, relying extensively on automation.

Not only will white-collar, administrative staff positions undergo slower growth in the future, but they are now beginning to be susceptible to the same permanent displacement once reserved for manufacturing workers only.

Dislocation, Not Unemployment, Is the Key Problem

Many of the forces that once prevented technological dislocation from translating into layoffs are weakening. Even if the growth in demand for services is strong enough in the future to prevent large-scale technological **unemployment**, it will only mask the turbulence and disruption brought on by large-scale **dislocation**.

An important, emerging issue intensifying employment problems is the elimination of "**duplicative work**" -- where advances in office automation allow firms to eliminate reproduced steps in the work process. As this proceeds, certain clerical occupations will be decimated.

I. Dislocation, especially in manufacturing, has been rampant, but displacement in the service sector threatens to become an even greater problem.

Between 1983 and 1988, almost half (47%) of displaced workers in the U.S. came from the service sector. Meanwhile manufacturing accounted for only 39% of all displaced workers.

The service sector's expansion has failed to prevent overall displacement from increasing. Service industries displaced 600,000 workers and nearly a million workers were displaced from wholesale and retail trade jobs.

- Seattle First National Bank has laid off about 1,000 employees in the past few years. Personnel division manager Timothy Powell advocates layoffs to achieve savings, calling it "pruning for strength."
- Shenandoah Life Insurance Company reduced its workforce 14% in a year and a half by restructuring the workforce into teams.

The increased productivity growth recently realized by manufacturing mainly has been the result of large-scale employment reduction, combined with sluggish or stagnant output growth.

II. Service and white-collar occupations are no longer safe havens from layoff, due to the displacement and restructuring that comes with new technology.

The number of displaced clerical workers continues to rise. Between 1983 and 1988, 655,000 clericals (age 20+, with at least three years' job tenure) permanently lost their jobs, up from 572,000 between 1979 and 1984. What makes this 15% increase so stunning is that it occurred during a period characterized as one of recovery. In January 1988, nearly one in three of those displaced since 1982 was still out of a job -- or out of the labor force.

Almost 700,000 workers were displaced because their position (or shift) was abolished -- much of this is likely to have involved automation.

- An insurance and investment corporation, Capitol Holding Company, reduced their data entry department by 75% through the introduction of an on-line data entry system.

Yet clerical displacement is hidden, and more difficult to detect. We see manufacturing displacement when a plant closes down, but clerical displacement is characterized by the loss of jobs within a classification, even in a growing business or industry, rather than by a company shutting down or relocating.

Not only does technology displace workers from lower and middle paying jobs more often than from the upper tier, but technology also creates an entirely new occupational structure. Insurance is an example of an industry where employers are introducing technology and eliminating many lower-skilled clerical positions outright, while upgrading the skill requirements for the remaining jobs without retraining workers.

III. Women, minorities and older workers fare worse from displacement than others. White-collar workers fare no better than blue collar workers.

About one-half of all displaced workers remain unemployed for six months or more. One in four white-collar workers displaced from 1983 through 1987 had not found reemployment by January, 1988 -- scarcely better than blue-collar workers.

An additional one in six of these displaced white-collars were underemployed. Almost half of the displaced who found reemployment now make less than their previous earnings (not including lost benefits).

- White-collar and service workers earn 9% less, while women white-collar workers average 16% less.
- White-collar workers forced to relocate in a new industry or occupation suffer even greater average earnings losses of 17% -- 25% for women.

Between 1981 and 1985, 10% of women workers were displaced -- and they experienced considerable hardship. Currently, one-third are either unemployed or no longer in the labor force. Eighteen percent were displaced because their position (or shift) was abolished.

Women dominate the fastest declining clerical jobs.

- Declines are expected for typists, stenographers, telephone operators, and data entry keyers, where women hold 88% to 95% of the jobs.

Black men in white-collar occupations suffer **twice** the earnings loss of white men who are displaced.

Displaced older workers experience the longest durations of unemployment -- **twice** as long for the 55+ group as the 25-54 bracket. Only 51% of those 55-64, and 30% of those 65+ found reemployment following displacement between 1983 and 1988. Because of the limited options for retraining or reemployment given to older workers, more than 64% of women aged 65+ withdraw from the labor force entirely upon displacement.

The economic status of women, minorities, and older workers has been adversely affected by the recent decline of union membership and bargaining power. Unions have traditionally aided or protected these groups. Technology-driven displacement and restructuring, as well as subcontracting and the marginalization of the work force have contributed to this decline.

IV. Growth of clerical employment is projected to slow dramatically.

Nationally, clerical employment is officially projected to grow by 11% by the year 2000 -- an annual rate of under 0.8% growth. These projections may be high, given the hidden displacement effects.

Women's projected labor force growth until the year 2000, 1.6% annually, is twice the rate of clerical job growth. Women aged 25 to 54 will be increasing their job participation at the even higher rate of 2.2%. This means an increasing number of women joining the workforce or seeking reemployment will be forced to take jobs in the lower paying, but higher growth service and sales occupations. Vocational training and career counseling must more strongly emphasize preparing women for high growth technical and professional occupations.

Office automation is providing the impetus behind expected declines in certain clerical occupations, such as those involved with financial record keeping and data entry. Other forecasters believe that new office technologies will be introduced and diffused so swiftly that by the year 2000 clerical employment will face absolute declines, by as much as 12%. We can expect job levels somewhere in between these projections.

V. Business communication is being rapidly transformed by computer systems that transmit transactions between companies electronically.

This is an extraordinary extension of the application of technology, which previously has been used primarily to reduce jobs within businesses. Due to the spread of electronic claims capabilities at insurance companies in the past few years, hospitals can now send out 90% of their claims in digital form through the telephone lines. Similarly, drug manufacturers currently receive 95% of their orders from wholesale druggists electronically over phone lines.

The savings for companies which adopt this technology are enormous.

- Super Valu Stores saves $6000 per day on invoices, and anticipates savings of $600,000 next year.
- It takes 120 days for Southwest General Hospital in the Cleveland area to receive payment on paper claims -- but now 30% of its claims are paid within three days

through electronic transmittal and processing.

- The electronic claims system of the Cleveland Clinic paid for itself in just one day's savings in receivables.

Transactions received electronically do not have to be rekeyed, enabling employers to slash data entry departments.

- For every 200 vendors that link up with the system, Super Valu Stores eradicates 30 data entry jobs.
- Garment manufacturer Garan, Inc. cut its keypunch department in half after implementing the system.
- Jones Transfer, a large national trucking company, aims to eliminate its entire data entry department by switching to electronic orders.

When George Klima, Director of Account Systems and Procedures for Super Valu Stores, was asked about data entry job loss, he answered, "What happened to all the people who made horse buggies and whips? They all got jobs somewhere else. The system changes."

Many data entry positions will be recast as higher skilled jobs. In lieu of keying, the few jobs remaining will mostly involve computer error and problem solving tasks. For example, the position replacing data entry at LTV Steel requires broad computer knowledge, communication skills, and general business skills -- which means applicants may need college education.

VI. To prevent clerical dislocation and mitigate turbulence from labor-saving technologies, including the elimination of duplicative work, several forward-looking policies must be adopted immediately:

- A massive retraining effort targeting women clericals is needed in order to upgrade workers for the relatively high growth technical and professional positions. Private employers must move away from the current human resource practice of raising hiring standards, and then hiring externally for upgraded positions, and move more toward internal training and retraining of their current personnel. Special attention must be paid to the needs of older workers as well. Public funding and assistance must be extended for existing retraining programs, and new programs must be created, such as individual training accounts for workers under risk of displacement.

- The federal law requiring advanced, early notification of impending permanent layoffs must be extended to cover smaller companies or departments within companies. Reassignment and voluntary transfer practices that relocate dislocated workers to new positions or departments must be more widely adopted as alternatives to layoffs.

- Innovative union contract language must be spread and used as models. Examples include the recent wave of job security clauses that guarantee employment over the life of a contract even in the face of automation, and the guarantees to replace significant proportions of positions left vacant.

o In addition, the private and public sectors must fund the establishment of more job retraining, worker upgrading and adult education programs in conjunction with community colleges, local universities and vocational schools.

CHAPTER I:

JOB DISPLACEMENT

Displacement -- jobs lost permanently after being held for at least three years -- has been growing significantly since the 1970s among white-collar and administrative workers as a result of employer staff reduction policies and the quickened pace of technological change. In addition, widespread job dislocation, including forced transfer, demotion, and job deskilling, is occurring in the service sector, with causes similar to manufacturing dislocation. Counter-forces, such as overall expansion of the clerical workforce, that had in the past minimized or offset dislocation in clerical jobs due to office automation are showing signs of weakening. The labor savings of new office automation threaten to be translated into absolute reductions in clerical employment.

Job Loss Spreads to Service and White-Collar Work Forces

Despite the much-praised economic recovery in recent years, job loss continues at high levels. A national survey by the U.S. General Accounting Office during the expansion years of 1983 and 1984 found that over one million workers in larger establishments and another one million plus in smaller-sized firms lost their jobs to business closure or permanent layoff.[1] The American Management Association found that nearly half of 1,134 companies surveyed indicated that they had reduced their work force in the 18 months from January 1986 to June 1987. The downsizing averaged 362 lost jobs per company.[2]

According to the most recent figures from the Bureau of Labor Statistics (BLS) of the U.S. Department of Labor, 9.7 million adult workers lost their jobs due to layoffs, company closings, or company relocations between January 1983 and January 1988.[3] Workers with three or more years on the job made up 4.7 million of the total. This represented a slight decline from 5.1 million displaced workers in the two previous surveys (1979-1984 and 1981-1986). Larry Mishel, an economist for the Economic Policy Institute, calls this drop "surprisingly small," given several years of economic upturn.[4]

There is no guarantee that job growth in the service sector will continue to offset manufacturing job loss. Service occupations do not magically appear when manufacturing jobs disappear. Harley Shaiken, an expert on the impact of technology, cautions that

> automation is simultaneously entering **every** productive sector in the economy. While traditional forms of automation affected only the factory, today we're seeing data-driven automation affecting jobs across the whole spectrum. This creates the danger of an economic vise -- workers being pushed out of the factory as a result of robotics and other technologies, yet being denied access to jobs in the service sector. Jobs in the office and service sector may not grow fast enough to take up the number of people displaced in other areas.[5]

The average rate of job loss among manufacturing workers is twice that of the entire employed work force, yet manufacturing accounts for only 39% of total job loss victims. **Because of the vast scope of the service sector, its job losses make up a larger portion than manufacturing**. Displaced service sector workers make up **almost half (47%) of all those displaced**, with almost 600,000 workers displaced from service industries and nearly one million from wholesale and retail trade.[6]

It is now well-documented that the service sector is creating virtually all net job growth in the economy (over 95% of all the jobs added to the economy in the last 15 years). Yet the Conference Board, a research group affiliated with major U.S. corporations, reports that nearly half of the 300 medium- and large-sized **service** firms surveyed had major reductions in their work forces.

One of the more remarkable features of the current wave of worker displacement is the extent to which downsizing has involved white-collar employment, once considered a safe haven from layoff. The Bureau of Labor Statistics (BLS) found that between 1979 and 1983, 700,000 managers and professionals lost jobs which they had held for three or more years. Between 1984 and the spring of 1986, an additional 600,000 or more middle- and upper-level executives lost their jobs.[7] It is estimated that over one third of U.S. middle management jobs have been eliminated in the past decade.[8]

The paring of white-collar staffs is mainly happening at companies with 1,000 or more employees. Business Week magazine reports that 89 of the country's 100 largest firms have formal programs to reduce their ranks of management.[9] Mobil has cut its white-collar payroll by 17% since 1982, followed closely by Du Pont, which eliminated 15%. Ford has reduced its salaried workers in 35 out of 36 recent fiscal quarters, and General Electric has slashed management at its Medical Systems Group by 35% since March 1987.[10]

Clericals have suffered cutbacks, too, although their losses seem to draw less attention than those of displaced high-level executives. For example, a staff analyst at Capitol Holding, an insurance and investment corporation, claims that their on-line data entry system reduced the data entry department by 75% in a year and a half.[11]

Total employment in manufacturing industries -- which includes executives and clerical workers -- rose by 70,000 through August of 1987. Yet **production worker** employment had rebounded to grow by 134,000 over the year. The 64,000 difference represents job loss elsewhere in the manufacturing firm, presumably in the office.[12]

Forces Causing Displacement and Dislocation of Workers

The manufacturing employment declines nationwide can be traced to five general sources which continue to generate considerable displacement:

- restructuring through layoffs, staffing cutbacks or mergers;
- changing composition of demand away from goods toward services and away from domestic goods toward imported goods;
- relocation of operations abroad and plant closings;
- declining unionization and reduced union ability to prevent job loss;
- automation and technological advance, and the failure of managers, unions and workers to prevent layoffs.

Although not as obvious, parallel forces are at work in service-providing occupations. Some of the forces behind displacement and dislocation in the service sector are the following:

(1) the significant share of service employees whose employment depends on manufacturing production;

(2) relocation of clerical work abroad;

(3) corporate restructuring and mergers;

(4) public sector budget crunches;

(5) office automation.

1. Service Occupations in Manufacturing Firms

Rather than being replacements for manufacturing jobs, many service jobs rise and fall with the manufacturing sector. Although only 18% of employment is in manufacturing, another 35% of workers are employed in occupations which depend on the manufacturing sector.[13] This is one reason why we cannot expect clerical and service occupations -- in either manufacturing or service industries -- to pick up the slack left by blue-collar displacement.

2. Runaway Offices

Some firms are shifting clerical work -- such as data entry -- abroad, where wages are cheaper. There are an estimated 100 off-shore data-entry operations. For example, AMR Caribbean Data Services recently hired 350 workers in the Dominican Republic to process health insurance claims and credit card applications, in addition to the airline ticket information that is already being processed there. Norman Bodek, president of the Data Entry Management Association, predicts that toll-free telephone service will be the next booming off-shore data entry service.[14]

3. Mergers and Restructuring

Recently, mergers and buy-outs have become a phenomenon of unprecedented proportions, as illustrated in Figure 1.1. Corporate restructuring and the merger/acquisition wave often result in the elimination of layers of office staff or entire departments at one of the two merging companies. Many lower and middle-level management positions are then deemed redundant and are eliminated. And because clerical work is an "important part of the managerial function" of information processing, clericals are also dismissed.[15] As an example, the merger of Pacific Security and Wells Fargo Bank will result in 5000 jobs being phased out over a 5-year period.[16]

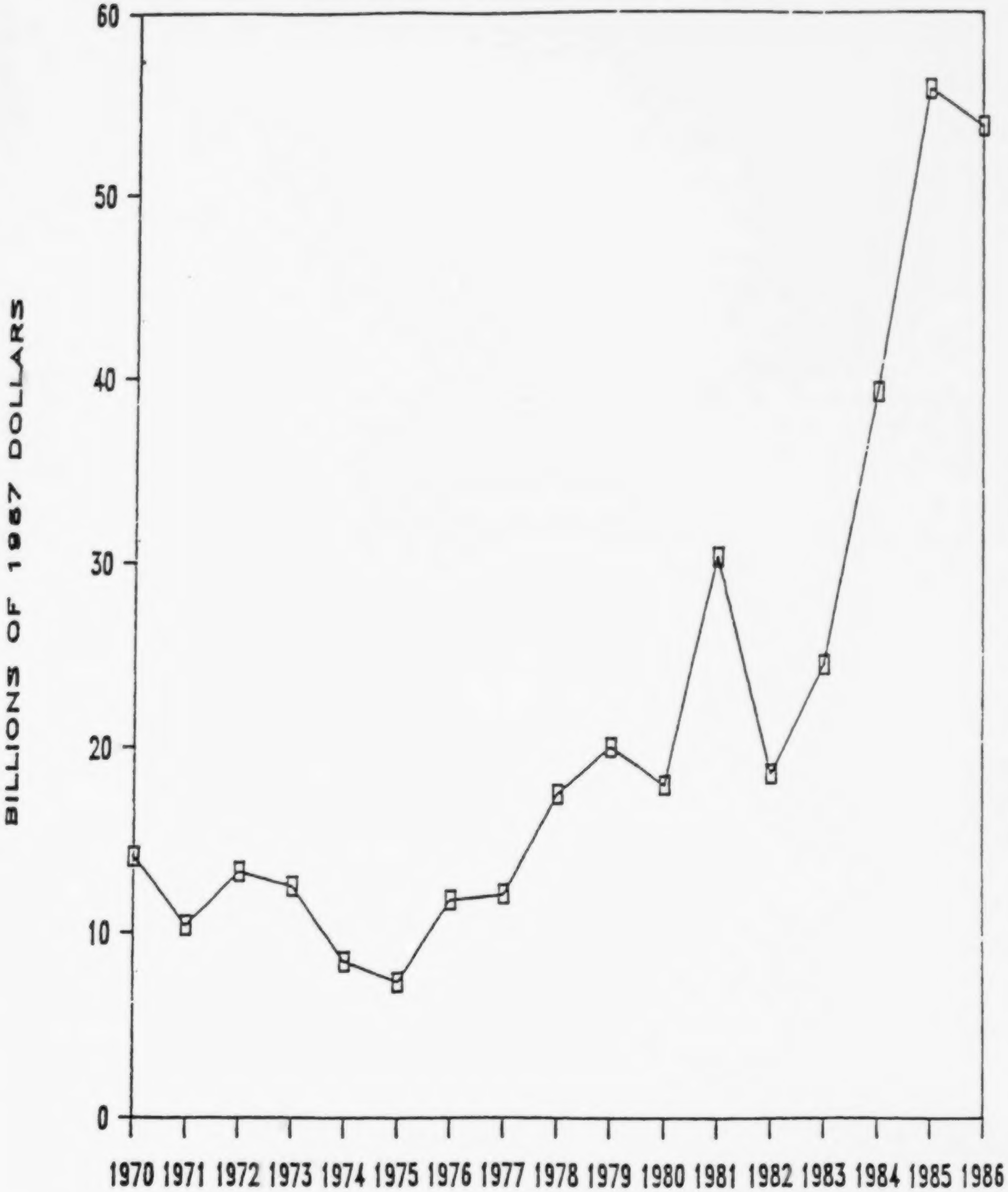
An important portion of displacement results from positions or shifts being abolished -- 15% of all workers displaced between 1983-1988.[17] This source of job loss has become relatively more important in recent years, especially for women, for whom 18% of displacement in this period was due to position or shift loss, up from 14.6% of women displaced between 1979 and 1983.[18] This indicates that recent restructuring of staffs has already begun to take its toll, in the form of greater permanent displacement of women.

4. Public Belt-Tightening

Public sector budgets, especially at the federal level, are likely to come under more pressure as legislators move to reduce the federal deficit. Most agencies are shrinking employment

FIGURE 1.1

TOTAL VALUE OF MERGERS AND ACQUISITIONS



SOURCE: Report of the Joint Economic Committee, U.S. Congress, March 1987.

through attrition, meaning that departing employees are not replaced.[19]

5. The Impact of Office Automation

The increasingly rapid pace of technological advance in the office, coupled with employers' push to reduce labor costs, threatens the job security of today's clerical workers as well as the opportunities for future clericals. (The findings of eight researchers on the adverse job impact of office automation are summarized in Appendix I.) Workers employed at the point of impact of new technology may be either permanently displaced from their present job (or even from their current type of work or industry), cut back to part-time hours, or find their job changed in terms of tasks required -- either upgraded or downskilled.[20]

The National Commission on Employment Policy estimates that 19 million workers -- 17% of the total workforce -- are in jobs directly threatened by office automation.[21] A recent survey found that over half of the chief executives of insurance companies said that computers significantly reduced overhead costs,[22] a large portion of which are clerical wages.

The primary reason clerical jobs are at risk as computer technology spreads is that clerks and computers are often interchangeable, similar to machine operatives and robots. For example, large computer-based data processing equipment can substitute for clerks in customer billing, filing and accounts maintenance.[23] Computer equipment thus often allows the **same level of output** to be produced using **less labor**.

The impact of office automation on jobs is widening as computerization spreads. With computers becoming more affordable, the pace of computerization has taken off. Where robots cost $60,000 and up, and a mainframe computer costs over $1 million, microcomputers for individual work-stations cost as little as $1,500.[24] One indication of increased reliance on office automation is increased commitment on the part of businesses toward high-tech projects -- now totalling 38% of capital budgets.[25]

Office automation has progressed so fast that over half of all white collar workers now make daily use of electronic terminals, up from 2% in 1976. In 1987 there were more than 36 million personal computers and terminals in workplaces across the country, with millions more in homes and schools.[26]

Moreover, new electronic technologies recently introduced or on the threshold threaten to have a far-reaching impact which has largely been overlooked by job forecasters. Foremost among these, Electronic Data Interchange (EDI) systems transmit orders, invoices and insurance claims in digital form through telephone lines, eliminating the need for rekeying that information at the receiving end. Thousands of data-entry jobs are at risk.

Displacement of Clericals is Hidden But Not Avoided

Overall rising growth of the service sector has cushioned the potential drop in clerical job opportunities. In addition, the typically high turnover found in clerical and service sector jobs has allowed significant job reduction to be achieved unnoticed, through attrition.

Although less obvious than layoffs, staff reduction through attrition represents a serious danger to clerical employment since it erodes overall job possibilities. The closing out of positions in larger firms often means the disappearance of jobs with well-developed promotion ladders. "Forced attrition" - such as early retirement programs offered under threat of layoff - disproportionately hurts older workers.

As service sector growth slows, the adverse impact of technology on employment is exposed. Facilitated by automation, companies will move to increase productivity by reducing their labor costs as much as possible. Automation of blue-collar jobs has caused millions of them to disappear in recent years. If and when demand tails off for services with high clerical staffing ratios, similarly massive displacement and dislocation could follow.

Additional Ways that Clerical Displacement is Hidden

Overall or industry-wide employment level data conceal various changes in the **quality** rather than quantity of clerical jobs available. At least two broad types of changes are occurring, both of which represent serious **dislocation** of clerical workers: the substitution of contingent jobs for full-time positions and the changing skill requirements of clerical jobs.[27]

More Contingent, Marginal Jobs

Temporary, part-time and contract workers now fill nearly one-third of all jobs,[28] including an increasing proportion of clerical jobs. Dun and Bradstreet's survey on part-time and temporary employment shows the dramatic recent increase in the use of "temps" -- now used by 27% of firms in the survey compared to 23% in 1986. Forty percent of these firms also use part-timers.[29]

Temporary help agencies, one of the most rapidly growing industries, now employ over one million workers nationwide. About two-thirds of these temporaries are clericals and over 60% are women.[30] In addition, 21% of women clerical workers worked part-time during 1986.

Part-time and temporary jobs are marginal: employers make little if any long-term commitment to these employees. A large and growing proportion of these workers would prefer full-time permanent positions. The 5 million U.S. workers involuntarily on part-time schedules now make up a record 32.5% of all part-time workers.[31] Part-time and temporary workers are paid significantly less than full-time permanent employees, and frequently receive little in the way of benefits, from sick leave and holidays to medical insurance and pensions. A recent BLS survey of temporary help agencies found that hourly earnings of temporaries average only 63% of full-time earnings and less than one in four receives health insurance coverage.[32] The jobs also have less security and fewer promotional opportunities.

Unable to find other work, a significant portion of displaced workers are being forced into marginal jobs. Since 1979, 10% of formerly full-time workers have been forced to accept reemployment in part-time jobs after displacement.[33] By accepting less beneficial terms of employment, they are pushed into a lower standard of living. These displaced and now marginal workers struggle under the burdens of their hidden dislocation while their predicament does not show up in unemployment figures.

Downgrading or Upgrading of Skills Requirements

The second way in which the potential negative impact of computer technology on employment is absorbed, and therefore hidden, is through altering skill requirements. Looking only at the aggregate level of clerical jobs **does not reveal** the large impact computerization often has on the job content of clerical positions at the individual firm level.

Only **case studies** of certain firms will reveal whether jobs are "deskilled" (as when the craft content of production jobs was removed by machinery) or upgraded following office automation; the impact varies widely by firm or industry or by the type of worker involved. In Patricia Flynn's 200 case studies, many workers displaced by new technology were transferred laterally or even promoted within the firm. Other workers, however, were downgraded, involuntarily relocated, or laid-off. Displaced white-collar workers were actually **less** likely than blue-collars to be promoted or upgraded to the new, high-skill jobs generated by the computer.[34] Those lesser skilled workers returning to the job market found themselves deemed qualified only for low skill, low paying jobs.[35]

Even in growth industries, such as insurance, the outlook for future workers is not promising. Diane Werneke of the International Labor Office, in her research on the impact of office automation, states:

> The automation of many insurance activities to date has not been accompanied by widespread displacement of workers because the growing number of business transactions has allowed many to be reabsorbed elsewhere in companies and because high turnover has meant that reductions in the clerical workforce would be accomplished by not filling vacancies. However, more widespread use of new technology is likely to affect many workers, who, without access to the training and skills required to move into new jobs, may find themselves displaced in greater numbers than in the past.[36]

Many forecasters predict outright clerical employment losses in insurance by the 1990s due to the early and rapid spread of technology. (See, for example, J. David Roessner's projections as described in Appendix I.)

Technological change in insurance companies is being accompanied in some instances by a management reorganization away from production-line claims adjustment or billing, toward having workers perform integrative, multi-tasked jobs. Less specialized clerks working in teams reduced life insurance policy renewals from a 27-day process to a two-day process at Shenandoah Life Insurance Company in Roanoke, VA. In three years, the number of policy renewals increased 28%, while the number of workers handling them fell 15%.[37] In companies switching over to a team system, up to 50% staff reduction in relevant departments is quite common.[38] The new jobs generated are not equivalent to the lost clerical positions. Workers from the "production-line" slots need additional training in order to qualify for the multi-tasked openings.

Office automation in the insurance industry is substituting for relatively lower-skilled, routine tasks: keyboarding, filing and office machine operation.[39] The elimination of lower-skilled jobs and increase of higher-skilled positions as a result of data and word-processing technologies is a trend that turned up in the majority of Flynn's case studies across several sectors. As described in Chapter IV, electronic business transaction systems such as EDI are also creating jobs with higher skills requirements in some cases.

However, it is also common for office automation to result in deskilling and job downgrading. Work becomes more standardized and tasks are more narrowly defined, resulting in deskilled jobs.[40]

Management practices can make the difference between job retention and dislocation. There are numerous examples of dismissals of current staff or entire departments after office automation is adopted. Skilled workers or workers with equipment-specific experience are then hired from outside the company, rather than retraining current staff.

Productivity Gains: At What Cost?

In the current drive by many U.S. companies to become more internationally competitive, productivity gains -- increased average output per worker -- are being pursued relentlessly. The benefits of productivity growth are well-chronicled: lower per unit labor costs and with it the potential to recapture lost markets and possibly lower inflation.

But whether technology-driven productivity growth in an industry is beneficial or harmful for the labor force depends on how that productivity growth is achieved. Technology can raise productivity either by being output-enhancing (with the same number of employees as previously used) or labor-reducing. Both generate fewer labor requirements per unit of output but the latter causes **displacement** of workers whereas the former constrains future growth in a firm or industry's job openings.

The increasing cost-savings of new office technologies mean that businesses, in future recessions, will rely more heavily on clerical staff cut-backs to improve productivity or to restore profitability. And when demand for a business's product or service is growing, it may try to achieve productivity growth through automation to avoid hiring additional white-collar support staff.

The Impact of Technological Change and Job Restructuring on Women, Minorities and Older Workers

Women dominate the fastest declining clerical jobs. In many cases, office automation eliminates lower-level jobs where women are concentrated and replaces them with jobs to which women typically have had restricted access.

As Table 1.1 illustrates, women are concentrated in the very occupations that automation is expected to curtail. According to Diane Werneke, "...in each department, company, or industry that introduces new technology, it will be the lower-skilled clerical and, in some cases, first-line management that are affected. The majority of these lower-level occupations are held by women."[41] The most rapidly growing occupation -- computer and related equipment operators --does not have a large female (or minority) representation. Therefore, shifts within the clerical field with additional computerization are not likely to be advantageous for

TABLE 1.1

JOBS THAT AUTOMATION PROMISES TO EFFECT MOST

		% Women		% Minority[1]		Total % Change Projected U.S. (by 2000)
	1972	1979	1986	1979	1986	
Data Entry	89.8%	95.3%	91.1%	23%	27.7%	-16%
Stenographers	90.4	93.4	89.8	13	7	-28
Telephone Operators	96.7	91.7	87.9	16.8	23	-18[2]
Typists	96.1	96.7	95.2	17.2	22.8	-14
Billing Clerks	84.6	87.7	89.2	10.5	16.8	+2
Computer & Peripheral Equipment Operators	37.8	61.6	68.5	13	20.1	+54

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[1] Includes all black and hispanic

[2] Excludes switchboard operators.

SOURCE: Employment and Earnings, January, 1980 and 1987.

women.

Automation also creates additional professional and technical jobs and centralizes more control over the workplace in its current senior managers, generating more of what are typically male-dominated jobs.[42] The programming, systems analysis, data management and electronic engineering positions that appear with computerization do not make the future particularly promising for women office workers. Women only hold about 25% of computer specialist positions and about 20% of engineering, science, and technical jobs.[43]

Minority workers face relatively more adverse employment consequences with technological change. Besides being concentrated in occupations and industries where jobs are at risk, non-white workers' prospects are further dimmed by the geographic shift of jobs made possible by computerization, and the upskilling of existing and new jobs -- outpacing growth in minority education and training levels.

The National Research Council's Panel on Technology and Women's Employment declares, "The introduction of advanced information and computer technologies thus far [has] resulted in relative, and in some cases, absolute, declines in back-office clerical jobs."[44] Table 1.1 shows that minorities have gained recently in those jobs predicted to be cut back by new office technology. Because of their concentration in vulnerable jobs, black workers are expected to lose 30,000 of the 136,000 jobs cut from in these occupations.[45]

The insurance industry represents a case in point. The occupations in the insurance industry with the highest percent of black workers are the relatively lower-skilled insurance jobs automation threatens to displace.[46] Many of these jobs will decline as technology progresses further.

In addition, computers are facilitating the elimination of bulk-processing centers where minority clericals are concentrated, in favor of decentralized settings.[47] Over the last several years home-office and data-processing centers have been relocating away from central cities and toward more remote suburbs with relatively small minority populations.

Minority women in particular will be profoundly affected by job loss in declining occupations and decreased demand for their skills. Because of their concentration in back-office occupations (as postal clerks, file clerks, data entry keyers, telephone operators, and typists), they are more at risk than others.

Finally, **older workers** have become increasingly vulnerable in the era of restructuring. A report written for the U.S.

Department of Labor states:

> Many companies with older workforces may find that their aging, higher-paid workers make them uncompetitive. With no way to recover higher pay scales, higher pension charges, and higher health care costs, companies may seek to roll back traditional seniority systems and other institutional arrangements for granting higher pay to older workers.[48]

Whether the "uncompetitiveness" issue is real or just perceived, the jobs and pay of older workers are targets in the recent cost-cutting mania. Forty percent of Fortune 500 companies have used early retirement schemes recently to cut staff.[49] For example, in 1987 RJR Nabisco offered early retirement to 2,800 hourly workers, about 17% of its work force at its R.J. Reynolds Tobacco Company subsidiary. The company cited automated production as the reason behind the desire to reduce jobs and trim its payroll.[50]

Only 15% of new workers between now and the turn of the century will be white, U.S.-born males. However, the growth in the jobs traditionally held by women and minorities will not be large enough to absorb their influx into the labor force. The brunt of the current historic shift in the job mix is shouldered by individual workers who must find ways to qualify for new occupations. The greatest shifts will fall upon minorities, women and older workers.[51]

New workers will be entering a job market with upgraded skill and educational criteria. More than half of the new jobs created between now and the year 2000 will require some education beyond high school. Compared to 22% of current jobs, 30% of the new jobs will go to applicants with college degrees. The fastest growing occupations demand much higher mathematical, language and reasoning abilities, with the result that 41% of the new jobs will require strong skills in these areas, as opposed to 24% of jobs at present (see Figure 1.2). The transition to the new job mix will be particularly difficult for minority, female and older workers whose educational backgrounds or skill levels do not match the new requirements.[52]

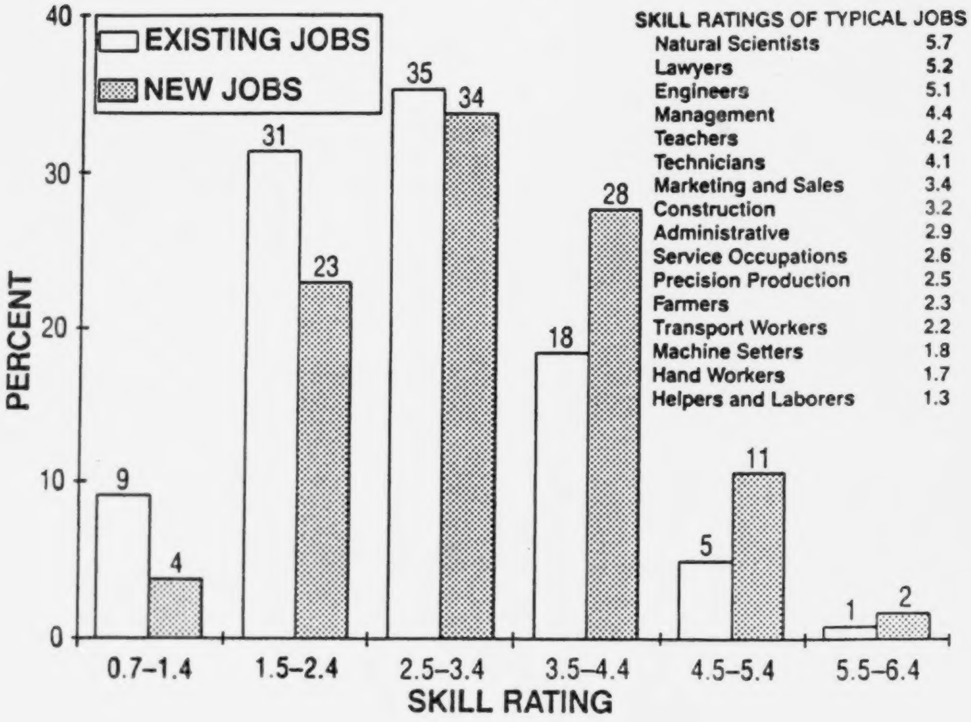
Job Erosion Revealed

At least four forces that once hid, minimized, or offset the displacement and dislocation in clerical jobs in the past may no longer do so:

First, job loss was prevented by the fact that the initial spread of technologies into workplaces was slow. The pace of adoption of computer technologies has climbed steeply, and is expected to continue at this rapid clip.

FIGURE 1.2

LOW SKILLED JOBS ARE DECLINING



SOURCE: William B. Johnston, Workforce 2000, Hudson Institute, p. 100.

A second factor has been the generally high economic growth in the past and the introduction of technology during periods of expanding demand. But virtually every forecast predicts future economic growth to be **slower** than during the 1960s and 1970s. If so, "the labor-displacing effects of pervasive and powerful technology will not be compensated for by growth in the overall economy."[53]

Third, high clerical staffing ratios -- proportions of clericals in a given workforce -- have in the past existed in those industries with high employment growth. But staffing ratios for clerical positions have been **falling** since 1972 in important industries such as finance, utilities, wholesale trade and public administration.[54] The clerical share of finance industry jobs fell from 56.3% in 1983 to 52.5% in 1987.[55] As staffing ratios fall, those industries will be contributing fewer job openings.

In insurance, for example, the consequences of the early and rapid diffusion of office technologies reduced the clerical proportion of employment from 50% to 45% over the 1970s, **falling by 73,000 jobs** while most other industries posted large clerical job gains. Routine operations such as keyboarding and filing dropped the fastest.[56]

A fourth reason total job loss was minimized in the past was that some new clerical jobs were added in the process of computerization. For example, as data processing technologies spread, the demand for data entry clerks and computer peripheral equipment operators expanded.[57] Once bureaucracies achieved reorganization around powerful computers, they found that hiring additional clerical workers actually added to the cost-effectiveness of the computer to the organization.[58] (Appendix II discusses some ways that office automation can indirectly create jobs, and why that effect will be minimal at best.)

Decentralized workstations may not create new classes of employment as did the main-frame computers introduced into workplaces in the 1950s and 1960s. The current wave of personal computers may actually remove the need for a large computer and the jobs that go along with it.[59] Furthermore, the type of jobs created by computerization are not necessarily clerical. A large portion of the jobs associated with computers are professional and technical, such as systems analysts and programmers.

New computer technologies -- expert systems, desk-top publishing, and others -- potentially threaten the number of professional, management and technical jobs available. These positions were the destination of an increasing number of clerical workers in the technologically progressing office.[60] If clericals have to compete with more highly trained employees for fewer jobs, job displacement from office automation will be magnified.

In sum, explanations for the lack of substantial clerical job loss in the past give us little hope for preventing displacement in the near future. Moreover, even if these forces are strong enough to prevent additional unemployment, the dislocation involved with technology is merely hidden -- not avoided -- by the overall employment growth. Despite their lack of anxiety concerning massive technological unemployment of office workers, the National Academy of Sciences concedes that

> technological displacement remains a potentially serious problem for some workers in the American economy of the 1980s and 1990s. Differences in the timing of the labor-displacing and labor-enhancing effects of technological change, coupled with the fact that jobs may be lost in industries, regions, or occupations that are very different from the ones in which job creation occurs, make it difficult for those workers and managers who must change their occupations and learn new skills.[61]

CHAPTER II:

CONSEQUENCES OF RECOGNIZED AND HIDDEN DISPLACEMENT

The consequences of displacement are harsh -- long spells of unemployment, reemployment at substantially reduced earnings, underemployment, or complete withdrawal from the labor force. The burden of displacement falls especially heavily on older workers, age 55 and up. Their median duration of unemployment is twice that of others, and less than one-half are eventually reemployed. The price for women is also dear, since they have a much higher likelihood of winding up out of the labor force and they suffer larger earnings losses than men, on average. The duration of unemployment of displaced minority workers tends to be longer, and blacks in white collar occupations tend to suffer twice the earnings loss of comparable whites upon displacement.

What Happens to Displaced Workers

Reemployment At Reduced Earnings

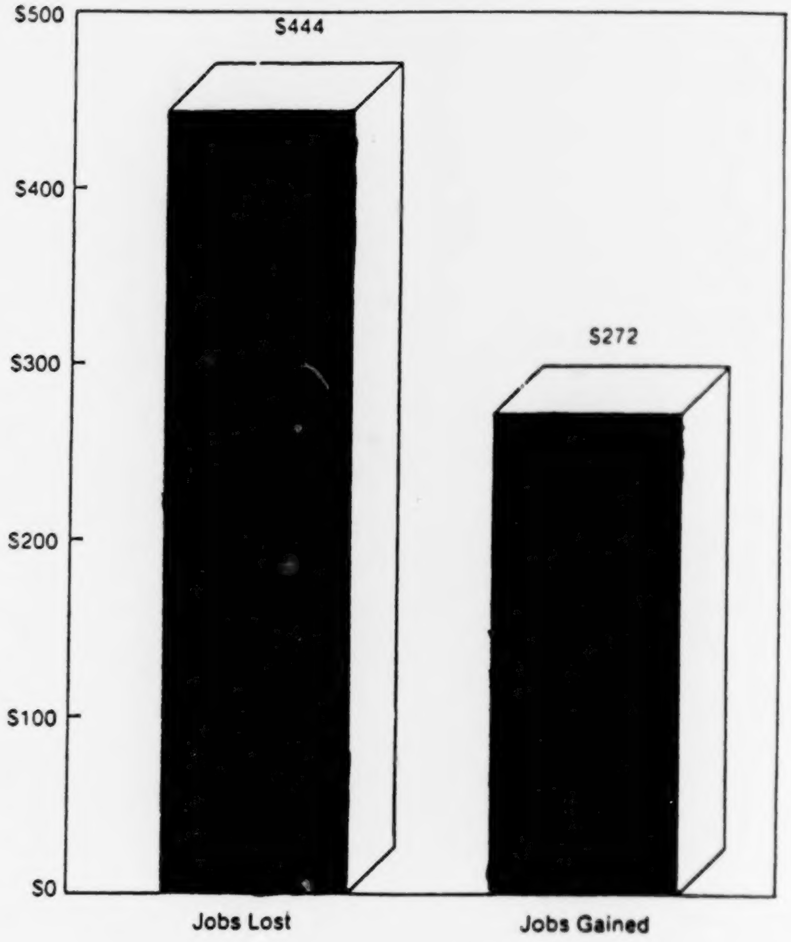
Both blue-collar and white-collar workers who are displaced from their jobs suffer considerable earnings losses.[62] Among displaced workers aged 20 to 61 with at least three years experience at their job, almost two-thirds were making less than their previous earnings level once they were reemployed.[63] White-collar and service workers' overall loss averaged 7%, but if forced to locate in a new industry or occupation, their earnings loss was 17%.

These facts do not paint the full picture. Loss calculations measure usual weekly **earnings** and therefore do not consider the potentially substantial loss of **benefits** -- in particular, reduced or entirely lost health insurance and accumulated pension credits -- as a result of displacement. The AFL-CIO's Industrial Union Department estimates that 36% of the workers displaced from 1979 to 1984 who had group health coverage on their old job lost it after displacement. About 20% of those who lost their health insurance coverage upon displacement between 1981 and 1985 remained uncovered, according to Bureau of Labor Statistics (BLS) estimates.

One reason for earnings loss is that the jobs being added to the economy simply pay much less than the jobs disappearing, as Figure 2.1 illustrates. The majority of displaced workers who were able to find reemployment did so in an entirely different

FIGURE 2.1

AVERAGE WEEKLY WAGES OF JOBS LOST AND GAINED



SOURCE: AFL-CIO's Industrial Union Department analysis of BLS data on wages in industries in which jobs were gained and lost between 1979 and 1985.

occupation. The BLS reports that only 45% of reemployed workers displaced between 1981 and January 1986 were working in the same general occupation that they had left. Technicians and related support workers had a rate closer to 30%.[64] Even for managers and professionals, the rate was only 51%.[65]

Unemployment and Labor Force Withdrawal

The most disastrous aspect of displacement is that it often results either in a very long unemployment spell or complete withdrawal from the labor force. The median duration of unemployment for a permanently displaced worker is over 18 weeks (see Table 2.1). About one-half of those displaced remain unemployed for six months or more, and one in five are unemployed for over two years.[66] Office workers do not fare much better than blue-collar workers once displaced. Forty percent of blue-collar workers never find reemployment -- and neither do 32% of white-collar workers.[67]

Furthermore, a significant proportion of workers displaced from full-time jobs become **underemployed**, that is, work at jobs with less than full-time hours, or at jobs which require less skill than their previous jobs.

Displaced workers have a disturbingly high likelihood of withdrawing from the labor force entirely. Almost 15% of those displaced over the period from January 1983 to January 1988 actually withdrew from the labor force.[68] White-collar and service workers have a higher than average likelihood of withdrawal. According to recent figures, 21% of all displaced clerical workers withdraw from the labor force.[69] Women tend to opt out of the labor force at rates many times that of men. Among white-collar and service workers, 20% of displaced women aged 20 to 61 withdrew between 1979 and 1984, whereas only 5% of their male co-workers did.[70]

The Social Costs of Displacement

Typically, workers who are not notified about job displacement are not prepared for job seeking or retraining. As a result, they incur a tremendous dollar penalty. To the individual involved, the cost of displacement amounts to $7,000. Estimates of the value of lost specific training range up to $15,700 and are usually higher for women than men.[71] These are conservative estimates since they exclude:

o the value of worker losses of occupation- or industry-specific training, when workers are required to take reemployment in a new occupation or industry;

o the value of the time the workers spend while unemployed, searching or waiting for suitable job openings;

- non-wage benefits lost, including unvested pension credits.

Consequences of Displacement by Labor Force Group

Displacement causes more hardship for relatively older workers, women, and minority workers. For these workers, displacement is followed by longer periods of unemployment and often complete forced departure from the labor force. Even if they do find reemployment, they suffer a larger drop in earnings.

Displaced Older Workers

Displacement means a much longer period of unemployment for older workers than others, increasing in length after the age of 45. The median number of weeks jobless is twice as long for those 55 and older as for those aged 25 to 54 (see Table 2.1).[72]

Thirty-five percent of displaced workers aged 55 to 64 remain out of the labor force -- almost four times the rate of workers aged 25 to 54.[73] Only 51% of those 55 to 64 and 30% of those 65 and over were employed at all following displacement -- the rest were either out of the labor force or still unemployed. In 1988, 27% more displaced workers aged 55 to 64 withdrew than in 1984.[74] The astounding 63% withdrawal rate for 65 and over job losers speaks for itself -- displacement causes a tremendous drain from the economy of senior, experienced men and women who would prefer and are capable of working.

Average earnings losses are considerably more severe for those over age 50 and for those that have accumulated ten or more years seniority at the job they lost. The average earnings loss is similar among white-collar and blue-collar job losers (see Table 2.2).

In addition to problems stemming directly from displacement, older workers typically receive less training and retraining assistance available through government-sponsored programs. Only 8% of Job Training Partnership Act (JTPA) program participants are 55 and up, although this age group makes up to 20% of those laid-off during the year and 13% of all employed. Very few employers -- even those with progressive personnel policies designed to benefit older workers -- focus continuous, intensive training or retraining efforts on older workers.[75] Private employer training programs specifically geared toward upgrading older workers' skills are typically short-term, machine-specific training (such as word-processing) rather than providing career-upgrading skills.

TABLE 2.1

DISPLACED WORKERS BY AGE, JANUARY 1986

Age and employment status, January 1987	Median weeks without work
Total:	
Age 20 and over	18.3
25 to 54 years	16.5
25 to 34 years	13.4
35 to 44 years	17.4
45 to 54 years	20.1
55 years and over	32.8

SOURCE: Monthly Labor Review, June 1987, "Displaced Workers of 1981-1985".

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Women And Job Loss

The earnings losses of service and white-collar women are nearly double that of men, averaging 16% for those displaced 1979 to 1984 (see Table 2.2). For those who had switched occupations, losses totalled 25% of previous earnings levels.

More than one in every three displaced women aged 55 to 64 withdraws from the labor force entirely, a problem that has been more pronounced for women than for men. For those 65 and up it is still worse -- **three out of four** displaced older women workers end up being pushed out of the labor force. Of women workers displaced between 1983 and 1988, only 49% of those aged 55 to 64 and 32% aged 65 and up were re-employed by January 1988.[76]

Displaced Minority Group Workers

Even with factors such as differences in education levels taken into consideration, the fact that a displaced worker was black outweighed any other reason to account for the **duration** of unemployment following displacement. Blacks made up 18% of those blue-collar workers, for example, unemployed for 52 weeks or more, although they made up only 13% of the total displaced.[77]

Displacement caused black males in white-collar occupations to suffer twice the earnings loss of their white counterparts on the average.

Displacement and Increased Income Inequality

Whereas displacement earlier this century often meant displacement from farm work to low skilled but higher paying manufacturing jobs, now higher-paid manufacturing and service-sector displaced workers are finding reemployment requiring different skills and often at less pay.[78] Displacement today generates more inequality than in the past because of the disparity in pay between the jobs disappearing and the jobs being created. (For a discussion of the impact of technological change on income inequality, see Appendix III.)

Displacement generates not only an immediate loss in real earnings for some but a **long-run** loss as well, since it usually means a loss of seniority status, a loss of firm-specific (non-transferrable) skills and knowledge, or an obsolescence of general (transferrable) skills. In addition, displacement today often entails finding reemployment in smaller, nonunion, typically service-producing firms that often have short, if any, job ladders to ascend over time.

Displacement worsens the already existing inequality of incomes among workers by burdening certain groups more than

TABLE 2.2

AVERAGE EARNINGS LOSSES

		Blue Collar		White Collar and Service	
		Male	Female	Male	Female
1)	Average	15.7%	15.8%	8.7%	16.2%
2)	Ages 50 - 61	17.7	22.2	18.2	18.9
3)	Seniority of 10 years or more	21.5	31.2	19.8	30.3

SOURCE: Michael Podgursky and Paul Swaim, "Labor Market Adjustment and Job Displacement: Evidence from the January 1984 Displaced Worker Survey," Final Report, Bureau of International Labor Affiars, U.S. Department of Labor, January 1986, Table 7.

others. For example, higher status workers tend to find reemployment more quickly; 78% of managers and professionals displaced between 1983 and 1988 were reemployed by January 1988, compared to 70% of all other occupations.[79]

Since displacement can cause either prolonged unemployment, withdrawal from the labor force, reemployment at significantly lower earnings, permanently lost benefits, or underemployment, more workers are placed at the low end of the income spectrum than would be otherwise.

CHAPTER III:

WHAT THE FUTURE HOLDS FOR CLERICAL WORKERS

Growth in job opportunities for clerical workers is expected to slow considerably, compared to what has occurred since the 1950s. ***Despite continued growth in the service sector industries*** *which traditionally have maintained a high proportion of clerical workers, official federal and state forecasters of clerical employment agree that* ***clerical job growth will not be as robust*** *as it once was -- dipping to 0.8% average annual growth nationally. Most of this slowing growth is due to the quickening pace and diffusion of office automation. And* ***new*** *technologies are appearing that threaten to make even the official projections of reduced-growth seem overly optimistic. Electronic Data Interchange (EDI) equipment is likely to impact adversely on clerical jobs in subtle, so far undetected, ways. Clerical occupations involving data-entry and financial records processing are particularly at risk. The burden of impending job displacement will continue to fall disproportionately on women, who are concentrated in those jobs most vulnerable to the spread of EDI and other new office technologies.*

The Continued Rise of the Service Sector

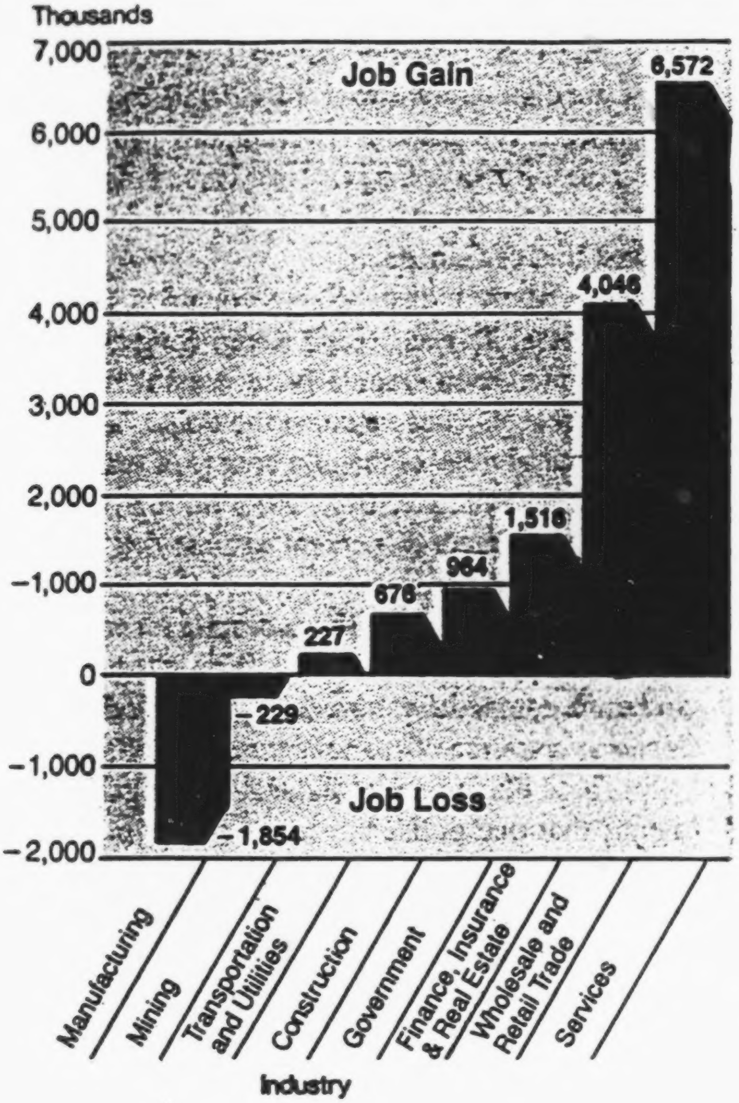
Jobs in industries which do not produce hard goods continue to account for virtually all job growth.[80] The rapid computerization of the factory has contributed to reduced or stagnated manufacturing work forces. The fastest growing service-producing industries are business and health services.[81] Figure 3.1 shows how jobs have shifted drastically between industries in the last eight years.

Not only are most new jobs appearing in services but more are in smaller-sized businesses. The average size of **service** establishments (as well as finance, insurance, real estate and trade establishments) is less than one-fifth the average **manufacturing** firm size of 60 employees.[82] Whereas 10 years ago 52% of jobs were in firms with less than 500 employees, by 1982 it had risen to 62%. For example, in 1985 only 14 of roughly 5500 establishments in finance, insurance, real estate and business services had 500 or more employees, in Ohio's Cuyahoga County.[83]

Since May of 1987, however, employment growth nationally has weakened in the service sector. The next wave of corporate

FIGURE 3.1

EMPLOYMENT CHANGE BY INDUSTRY
1979 TO JANUARY 1987



SOURCE: Bureau of Labor Statistics Figures.

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restructuring is likely to take place in service sector industries such as retailing, finance and business services.[84] Thus we can no longer rely on those industries which carried the load of job creation in the recent past to continue to do so.

Job Growth Projections

Jobs in service-producing industries are projected to rise by 27% between now and the year 2000, while manufacturing jobs are expected to drop by 4.4%. The largest growth should come in business and health services, while past sources of job growth, such as government, public utilities and communications, will either tail off or outright decline from their 1986 levels (see Table 3.1). The **share** of total jobs in manufacturing will fall from 18% to 13%, while miscellaneous services will climb to almost 25%, trade to over 23% and Fire, Insurance and Real Estate to 6.2% of total employment.[85]

One of the fastest growing business service industries (after computer and data-processing services) is personnel supply services, which is dominated by the temporary help service agency payrolls. Nationally, personnel supply services are expected to grow by a tremendous 82% rate by the year 2000. As of September 1987, one million U.S. workers were employed by temporary agencies. These agencies have been growing at a rate of 19% since September 1986, suggesting that their growth will push personnel supply service employment higher than the BLS projections.

Clerical employment is expected to rise only 11.4% by the year 2000 (or 0.8% per year), whereas clerical growth for 1972-1986 was over 35% at the national level. Because of this, the clerical **share** of total employment is predicted to fall from 17.5% to 16.6%,[86] regardless of the rate at which the overall economy grows.

Some forecasters expect automation to have an even more severe impact on total clerical employment. Richard Belous, for example, predicts that clerical employment will fall from its current level to only 15 million by the year 2000, down to 11.4% of the total work force.[87]

Clerical staffing ratios have been falling through the 1980s,[88] and will continue to do so. The two major industry categories with traditionally the highest proportion of clerical staff -- transportation/utilities and FIRE -- have recently been cutting back clerical positions.

In trade and FIRE, the growth of clerical jobs will be slower than growth of employment in **all** occupations, and clerical employment will fall outright in manufacturing, construction,

TABLE 3.1

EMPLOYMENT CHANGE FOR MAJOR SECTORS AND SELECTED INDUSTRIES, 1972-86 AND PROJECTED 1986-2000

Industry	Level	Number (In thousands)		Percent change		Annual rate of change	
	1986	1972-86	1986-2000	1972-86	1986-2000	1972-86	1986-2000
Total		27,074	21,407	32.0	19.2	2.0	1.3
Nonfarm wage & salary	99,044	25,530	20,112	34.7	20.3	2.2	1.3
Goods-producing	24,861	1,013	-3	4.2	0.0	0.3	0.0
Mining	783	155	-59	24.7	-7.5	1.6	-0.6
Construction	4,904	1,015	890	26.1	18.1	1.7	1.2
Manufacturing	18,994	-157	-834	-0.8	-4.4	-0.1	-0.3
Service-producing	74,383	24,517	20,115	49.2	27.0	2.9	1.7
Transportation & Public Utilities	5,244	703	475	15.5	9.1	1.0	0.6
Transportation		363	459	13.6	15.1	0.9	1.0
Communications		127	-57	11.0	-4.5	0.7	-0.3
Public Utilities		213	74	30.0	8.0	1.9	0.6
Wholesale trade	5,735	1,622	1,531	39.4	26.7	2.4	1.7
Retail trade	17,845	6,010	4,857	50.8	27.2	3.0	1.7
Eating & Drinking Places		3,019	2,486	105.6	42.3	5.3	2.6
Finance, Insurance & Real Estate	6,297	2,390	1,620	61.2	25.7	3.5	1.7
Services	22,531	10,414	10,014	85.9	44.4	4.5	2.7
Hotels		588	570	72.3	40.7	4.0	2.5
Personal Services		192	253	21.1	22.9	1.4	1.5
Business Services		2,991	3,340	167.1	69.1	7.3	3.9
Personnel Supply		796	834	360.2	82.0	11.5	4.4
Computer & Data Processing		484	612	452.3	103.5	13.0	5.2
Health Services		3,139	3,223	92.0	49.2	4.8	2.9
Hospitals		1,058	475	53.4	15.6	3.1	1.0
Outpatient Care & Other Health Services		445	512	304.8	86.6	10.5	4.6
Educational Services		470	192	49.1	13.4	2.9	0.9
Government	16,711	3,378	1,618	25.3	9.7	1.6	0.7
Federal		215	101	8.0	3.5	0.6	0.2
State & Local		3,163	1,517	29.7	11.0	1.9	0.7
Agriculture		-271	-335	-7.7	-10.3	-0.6	-0.8
Private Households		-452	-26	-26.7	-2.1	-2.2	-0.1
Nonfarm Self-Employed & Unpaid Family Workers		2,267	1,656	39.0	20.5	2.4	1.3

SOURCE: Bureau of Labor Statistics, The Workforce in the Year 2000, 1987, Table 4.

mining, transportation, communications, public utilities, and government.[89] The industry expected to boom -- services -- is **not** one of the industries that employs a relatively large proportion of clericals.[90]

Business Growth Will Exceed Employment Growth

Because of the spread of office automation, an increasing value of business output alone will no longer produce a proportionate rise in employment. The financial growth of a particular firm does not necessarily translate into equal job growth. Table 3.2 illustrates that output growth for an industry will be accompanied by significantly weaker growth in employment levels for every major industry category through the year 2000.

One of the effects of computer technology is that it creates increased capacity. Tim Brady and Sonia Liff have documented several instances where, because of the excess-capacity produced by the computer, firms could increase production significantly without adding workers when demand rose.[91]

Spatz and Company, the country's 38th largest shopping center management company, started in 1981 with four properties, three bookkeepers, and one computer. Today it maintains 65 properties with only one more bookkeeper. The company president estimates that without the main-frame computer it purchased, they would need an additional 16 bookkeepers, which would mean $474,000 higher payroll costs annually.[92] Even strong growth in demand for their service was not enough to translate into clerical job growth.

Job-curtailing automation in insurance is becoming well-documented. As an example, Diane Werneke describes how

> Blue Cross and Blue Shield was enabled to keep constant the number of clerical employees engaged in processing health and disability claims despite a large increase in volume. In 1976, the 127 employees of Medicare B were processing 830,000 claims annually; in 1981 the same number of workers processed 1.4 million claims annually. More generally, large declines have been recorded for those clerical jobs involving record keeping, transcribing premium payments, assembling records, calculating policy values, and handling remittances. Other positions dealing with transactions and communications, such as accounting and correspondence, have remained stable, but transaction volumes have risen considerably.[93]

Similarly, since 1984 the life insurance business has grown while holding stagnant the number of employees.[94]

TABLE 3.2

ANNUAL RATES OF CHANGE: EMPLOYMENT VS. OUTPUT, BY INDUSTRY, 1986-2000 PROJECTED, U.S. (MODERATE PROJECTIONS)

	% Employment Growth	% Output Growth
Total	1.3	2.4
Manufacturing	-0.3	2.3
Durable	-0.3	2.7
Nondurable	-0.3	1.8
Transportation	1.0	2.4
Public Utilities	-0.9	3.1
Communications	0.6	2.1
Wholesale Trade	1.7	2.7
Retail Trade	1.7	2.7
Finance, Insurance & Real Estate	1.7	2.6
Services	2.7	3.2
Business Services	3.9	4.2
Health Services	2.9	3.4
Government	0.7	1.5

SOURCE: Monthly Labor Review, September 1987, pp. 42-44.

The Impact of New Office Technologies on Clerical Job Growth

Because technology's impact on clerical occupations varies widely, some clerical positions will be declining while others grow rapidly in number. Jobs for computer equipment operators are increasing rapidly while certain other clerical positions -- typists and billing clerks, for example -- have actually been declining in absolute number. Job growth in the secretarial and financial records processing areas, particularly, has been declining as of late.[95]

About one-third of companies surveyed in a recent study said they reduced clerical labor costs by 10% or more with office automation (see Table 3.3). Much more clerical labor time is cut than management, and it is one of the chief cost savings yielded by office automation. Clerical positions curbed **directly** by automation of the office include bank tellers, stenographers and telephone operators as the most vivid illustrations.

J. David Roessner's projections for the banking and insurance industries suggest that if new technologies such as artificial intelligence, optical scanning and voice recognition systems are diffused rapidly, the clerical work force in these industries could conceivably be much smaller than numbers forecast by the BLS. He suggests that the amount of clericals required may be drastically reduced in the late 1990s by the labor-reducing effect of technologies that will soon be introduced in the two industries. One scenario puts the reduced clerical time requirement in these industries at only 40% of their 1980 time requirements to perform the same tasks.[96] (For more detail on the predictions of clerical workforce reduction by Roessner and other researchers, see Appendix I.)

Clerical Job Losses from EDI and Other Technologies

Other clerical occupations are now becoming exposed and more vulnerable as more industries are moving to adopt inter-organizational computer and communication equipment, such as Electronic Data Interchange (EDI). New technologies are allowing tasks that were once performed twice (or more) at separate work sites or distinct organizations to be executed only once, eliminating "duplicative work." Occupations soon to be affected include data-entry keyers, financial records clerks, billing clerks, statistical clerks, order clerks and insurance claims clerks.[97]

In 1985 the U.S. Congress's Office of Technology Assessment (OTA) pointed out the coming impact of EDI:

> When organizations exchange information either directly or through a client (e.g. payments and receipts, or a patient

TABLE 3.3

WHERE OFFICE SYSTEMS SAVE MONEY

	Percent of respondents that cut costs by 10% or more	
Area of Saving	Smaller Companies*	Larger Companies**
Communications	36.5%	39.3%
Photocopying	33.5	33.3
Clerical Workers	34.5	29.9
Storage	27.0	26.4
Paper	31.5	25.4
Professionals	6.0	5.5
Middle-Level Managers	6.5	5.0
Top-Level Managers	1.5	1.0

*200 companies with 100-999 employees.
**200 companies with 1,000 or more employees.

SOURCE: DATAQUEST INC. Reprinted table from Business Week, October 12, 1987. Results of Dataquest study 400 of companies to see where automated office systems cut costs.

> sending hospital bills to a health insurance provider) the information often must be rekeyboarded even if it came from one computer and goes into another computer. But much of this work is being eliminated, or is likely to be eliminated in the future. Increasingly, computers are able to communicate directly with each other, through modems or other technological means. A second way of eliminating data-entry work is to allow (or require) a consumer or client to enter information directly into the organization's computer. Organizations are seeking and finding ways to avoid the necessity of keyboarding data for a second, third, or fourth time. Beyond that is the possibility of never having to keyboard it. If this happens, then the number of jobs dedicated to data entry will decline dramatically.[98]

As an example, 95% of surveyed life insurance companies had a communications network linking the home offices with field offices or agencies; full transactional interface was possible for 89% of the respondents with such networks.[99]

> [I]nsurers are attempting to pare down the labor intensity of the production process by moving as far as possible in the direction of single-source entry. In general, the trend is toward data capture at the point of generation....it is in fact this organizational change which may have the most significant impact on aggregate employment.[100]

Clerical tasks of communicating to other, related organizations are being revolutionized by EDI and other new technologies. According to Business Week:

> The greatest benefit of office automation lies not just in doing existing work faster -- it comes from shaking down the organization to eliminate whole chunks of redundant work.[101]

The OTA's predictions are quickly becoming real: data is increasingly being captured at the point of origin, data entry is becoming centralized, and there is a decreasing need for repeated keyboarding.[102] The employment impact is becoming apparent in electronically linked organizations. The simple removal of duplicated tasks **within** the organization with the advent of office automation is now becoming possible **between** organizations.

Among clerical jobs related to the technology-driven removal of duplicated work, the BLS projects **significant** declines only for statistical clerks and to some extent data-entry keyers. The remaining jobs at risk are all expected either to decline negligibly or increase by the year 2000.

The coming pruning of data entry positions within major industry divisions is displayed in Table 3.4. The data entry share of total employment in these industries is projected to

TABLE 3.4

PROJECTED DECLINES IN DATA-ENTRY POSITIONS, BY INDUSTRY, U.S.

(In Percentages)

	U.S. (1986-2000)
All Industries	-16%
Manufacturing	-38
Transportation/Communication/ Utilities	-31
Wholesale/Retail Trade	-22
Fire, Insurance and Real Estate	-20
Government	-34

SOURCE: Bureau of Labor Statistics, "Employment by Industry and Occupation: 1986 and Projected 2000 Alternatives", unpublished data.

decline sharply.

The potential job impact of these technologies is being underestimated. BLS projections -- including the decline of 16% for data-entry workers -- only include technologies whose employment impact is clear. The projections miss the possibility that we are on the brink of an astonishing transformation in just the next few years through the rapid spread of EDI and related technologies. One clue that these technologies are having a widening impact is the rising number of displacements due to position, shift or department elimination.[103]

"Pruning For Strength": Costly Productivity Growth

> Real office productivity comes from changing work processes and eliminating steps throughout the organization, not just speeding up work.[104]
>
> Business Week, Oct. 12, 1987

Firms in almost every U.S. industry are responding to heightened competition by attempting to cut costs and boost productivity. Many find that, for the short-run, they can achieve both simultaneously by cutting or restraining growth in staff. In the banking industry, for example, Timothy Powell, personnel division manager of Seattle First National Bank, recommends layoffs as the best way for a bank to achieve big savings on personnel costs. Its layoff program is dubbed "pruning for strength."[105] Seattle Bank has laid off about 1,000 employees in the past few years.

Productivity may increase in the coming years simply because of widespread staffing cuts, particularly white-collar, in numerous industries. The Hudson Institute's projections for the U.S. Labor Department expect productivity to rise an average of 1.5% per year until the year 2000 -- 3.9% in manufacturing and 0.9% in commercial and other services -- even though productivity growth had averaged only 0.7% growth per year between 1970 and 1985. The bulk of the predicted rebound in productivity growth comes from the manufacturing sector, which recently has been dramatically reducing its white collar staff.

This productivity gain is of the negative variety, in the sense that it entails extensive dislocation and requires continual, permanent employment reduction in order to sustain productivity growth every year. With this variety of productivity growth, growth in demand for services or growth of industries with large clerical staffs, will not be able to offset coming technological displacement -- including duplicative work elimination.

Women's Labor Force Growth Will Exceed Clerical Job Growth

About 30% of women are employed in the clerical sector -- by far the largest occupational category for women. But two factors are tending to work against clerical job opportunities for women workers:

The number of new women workers will be twice that of new clerical jobs. Clerical jobs are projected to expand by 0.8% per year in the coming years, while the number of women in the labor force will grow by about twice that rate -- 1.6% a year. Women aged 25-54 will experience about 2.2% annual growth.[106] It is the economic status of this latter group which is at high risk as clerical job opportunities diminish.

The lack of training will force women to take lower paying service and sales jobs. As the proportion of all jobs in the clerical categories decline, an increasing number of women joining the labor force or having to seek reemployment will have to take jobs in the relatively lower paying, but higher growth, service and sales jobs.[107] The only recourse lies in a massive private or public sector retraining of women clericals -- both displaced and currently employed -- qualifying them for the high-growth technical jobs (of which women make up only 29% in non-health fields) and professional jobs.

By the year 2000, nearly two-thirds of all adult women will be employed, making up 48% of the labor force.[108] About 85% of new labor force entrants in the coming decade-and-a-half will be women or minorities.[109] This makes it all the more essential that the new jobs created in the economy in the coming years include high-quality entry-level jobs with possibilities for advancement.

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CHAPTER IV:

ELECTRONIC ELIMINATION OF REDUNDANT DATA ENTRY

THE CASE STUDIES

Advances in Electronic Data Interchange (EDI) and Electronic Claims Submission (ECS) technologies allow organizations to electronically transmit information to other organizations. Companies transacting with other companies in entirely different industries are becoming linked, primarily through third-party networks. Data needs to be keyed into the computer system only once for a two-party transaction. This already has begun to dramatically reduce the demand for data entry clericals, and it threatens to reduce the demand for billing clerks, insurance claims clerks and materials and service order clerks. Four areas where EDI is spreading are: the distributor/supplier connection in manufacturing, wholesale and retail trade industries, the shipping and transportation industries, and the insurance company and medical provider nexus. In each area, companies deploying EDI-type technologies realize considerable savings from the reduced need for re-keying of purchase order, invoice, claim or payment information. The effect on employment of data entry keyers will be dramatic -- on the order of a 28% decline by the year 2000. This is steeper than the 16% decline anticipated by official forecasters. In addition, changing job skill requirements are creating a new class of higher skilled data entry workers, whose function is to evaluate incoming information or troubleshoot on problem transactions. These newly created jobs will not necessarily absorb displaced workers, nor will they number nearly enough to offset the coming job loss.

The Rise of Electronic Business Transactions

Computer capabilities have dramatically changed communication between companies in the past decade. With the advent of personal computers and affordable mainframes, electronic communication through networks and electronic mail have begun to supplement -- and supplant -- printed correspondence and telephone communication. At first, companies were able to send data between departments and branches via computer in a limited fashion. However, sending information between **different** companies within the same industry was problematic, since companies used incompatible computer systems or document formats.

Through the 1980s, information-oriented managers in the various industries have focused on developing common formats. With a standard operating format, electronic communication between businesses is now possible. For example, a pharmaceutical wholesaler can now order from a vendor electronically -- drastically cutting or even eliminating the labor involved in paperwork and the time involved in transmission through the mail. Reduction of ordering time also allows pharmaceutical companies to keep warehouse stock at a lower volume. Electronic orders are now the rule, not the exception in the drug business; manufacturers receive 95% of their orders from wholesale druggists electronically.[110]

Many companies route their electronic communication through a third-party network, which acts as an electronic postal service for a company's data transmission. The networks eliminate the need to contact each company directly to send information. Corporations doing a high volume of electronic business may find it simpler to transmit all transactions to a third-party network and let the network distribute them. As John Witten of DNS Associates, a Philadelphia firm that develops translation software, comments, "LTV Steel uses 1,300 carriers. Now you tell me who wants to contact all those people directly several times a day?"[111]

Information sent to the network is "translated" into the appropriate industry format before being transmitted to the addressee. A transaction that is in the in-house format of the sender is altered to fit the agreed-upon industry format, then translated from the industry standard to the in-house format at the receiver company. Translation allows each company to use differing formats without having to worry about hardware and software compatibility. Individual companies with the appropriate translation software can bypass the network and transmit directly.

Some companies are willing to set up their clients with personal computers and software, while others rely on old-fashioned corporate arm-twisting to get their clients on the system. Electronic communication has many benefits to companies:

- **elimination of duplicative work** -- data entry needs to be done only once.
- **elimination of errors** -- when data is entered only once, the chance of error decreases.
- **lower administrative costs** -- with fewer data entry workers, supervision and space costs decrease.
- **inventory savings** -- reduction in ordering time allows less money to be tied up in inventory.

- **good marketing tool** -- companies with electronic transaction capabilities can claim to be on the cutting edge of technology in business communications.

- **improved productivity** -- labor time spent on clerical tasks is reduced, which reduces total labor costs.

- **greater volume of business** -- companies with electronic transaction capabilities gain favor with similarly equipped companies.

One of the major effects of handling business transactions electronically is that data is entered closer to the point of sale. Subsequent data entry is not needed and jobs are eliminated. In addition to the distributor/supplier connection (examined below), there are two other types of examples of this trend:

> The selling agency handles pricing and selling electronically and produces the paper representation of the product on behalf of the industry it represents, using software supplied by that industry. Examples: insurance agencies and travel agencies.
>
> The buyer of the product does the keying of information. Examples: point of sale terminals in airports and department stores.

Several factors slow the adoption of electronic communication:

- **agreement on standards** -- each industry must be willing to settle on a specified format that will benefit each company involved.

- **reluctance to give up paper** -- there are restrictions on some kinds paperwork, such as legal documents, being converted into electronic form.

- **implementation costs** -- the price-tag for the necessary hardware and software may be prohibitive.

For many industries the benefits of electronic business transaction offset the disadvantages by such a large margin that it is expected to spread rapidly over the next few years. This puts clerical occupations with tasks involving data entry at risk. Even BLS predictions of a general 16% decline in data entry positions by the year 2000 do not adequately reflect the impact of this trend. We anticipate that data entry jobs will roughly decline by an average of nearly 2% per year, for a total drop of 27%.[112]

Even if unforeseen clerical jobs are generated in the coming years, it is unlikely that those newly-created jobs will require data entry skills only. Retraining will be necessary for displaced data entry keyers.

Case Studies

Several examples of the use of electronic business transactions will be explored below with an emphasis on direct benefits, impact on employment, effect on skill levels, and structural changes. (Because this investigation was funded in part by the State of Ohio, many of the following examples are firms located in Ohio.)

The Distributer/Supplier Connection

Electronic data interchange (EDI) is increasingly being utilized to connect companies-that-supply with companies-that-distribute: manufacturers with wholesalers, retailers, and other customers; wholesalers with their customers, and so on. "EDI will have a profound effect on how businesses relate to one another," says Richard Norris of Arthur D. Little Inc.[113] Even in a low margin business such as the grocery industry, "growth has been steady and constant, especially among the big customers," says Charles Kosy, Senior Technical Consultant for General Foods in White Plains, New York. "The top 10 to 12 customers are all on [EDI]."[114]

Typically orders, confirmations and invoices are collected and distributed by third-party networks, which maintain "mailboxes" for each of their clients. Businesses at both the supplier and distributor end of the transaction electronically "check their mailboxes" periodically.

Recent agreement on standard formats presages more widespread investment in systems that can transmit orders, invoices, and ultimately, funds. "It's...changing the way America does business," says Audrey Mandela, a market researcher in Boston.[115]

What are the Benefits and to Whom?

EDI reaped four benefits for American Seaway Foods, Inc. a wholesaler in Bedford Heights, Ohio according to Frank Smith, formerly their Systems and Programming Manager: (1) it improved order turnaround time by one day ("a big payback"); (2) it allowed a reduction in inventory; (3) it reduced data entry; and (4) it reduced other clerical time, such as time involved in mailing.[116]

For The Kroger Company, a Cincinnati-based supermarket chain, "the biggest savings is in inventory carrying cost -- the 'lost opportunity cost' of having money tied up in inventory," says Dave Morehead, Manager of Procurement Systems.[117] Consistent with this, the initial impetus for EDI within Kroger came from the Inventory Control Department.

"We wanted to save time, money and duplicative work," says Ed McClosky, Project Leader for New York garment manufacturer Garan, Inc. "We're trying to save money on big stuff like computers and hardware and on **small things** like programs and **data entry positions**" (emphasis added).[118]

The benefit from data entry labor time reduction occurs at the receiving end of the business transaction. In the case of electronic **orders** for supplies, the supplier, whether manufacturer, wholesaler, or broker, does not have to rekey the information. Kosy of General Foods estimates that EDI orders require "only five to ten minutes of checking, instead of a half hour of phone time."[119]

Retailers receiving **invoices** or **order status** by EDI similarly eliminate rekeying. Marketing literature for American Hospital Supply Corporation claims that the system they offer, ASAP-4 Link, is "The Ultimate in Paperless Processing":

> **Eliminates Time-consuming Duplicate Entry** -- Now there's no need to re-key order status information into your system, as this occurs automatically.[120]

George Klima, Director of Account Systems and Procedures at Super Valu Stores in Hopkins, Minnesota, says:

> We are saving $6,000 a day on invoices. We are looking next year to save $600,000 with this process. We save $1.20 per transmission using EDI. If we sign up 200 vendors that is a savings of 30 people [data entry clerks]. That is a $300,000 savings. EDI is slowly but surely eliminating the need for data entry. This is a significant savings for us. In effect, the sender of our data maintains our files.[121]

Joe Menth, Transportation Planning and Control Analyst at Target Stores in Minneapolis, confirms this picture, saying savings are in the "thousands and thousands."[122] Table 4.1 shows projects savings from EDI in the grocery industry.

The major retailers are insisting that manufacturers and other suppliers start using EDI. According to Gabriella Havasy, controller at an Ohio food broker, "The customers [supermarket chains] in California initiated the [EDI] system and insisted that manufacturers start using it."[123] This is substantiated by Kosy of General Foods, who states, "Super Valu and Safeway were

TABLE 4.1

INDUSTRY WIDE SAVINGS FROM ELECTRONIC DATA INTERCHANGE (EDI)
(50% Participation)
(In Million $)

DIRECT SAVINGS	CHAIN/RETAILER	WHOLESALER	MFG	TOTAL
Purchase Orders	$ 8.2	$ 13.8	$ 16.5	$ **38.5**
Invoices	13.2	2.5	6.2	**21.9**
Pmt Advice & Adjustments	5.2	0	6.8	12.0
Announcements	1.8	1.1	1.1	4.0
Reduction in Human Errors	2.3	0	5.2	7.5
Total Direct Savings	$ 30.7	$ 17.4	$ 35.8	$ 83.9
INDIRECT SAVINGS				
Reduction in Invoice Adjustments	$ 12-23	$ 0	$ 21-33	$ 33-56
Reduction in Inventory	35-52	0	35-52	70-104
Reduction in Clerical Support	3-14	10-21	2-29	**15-64**
Reduction in Sales Calls	3-9	2-5	5-18	10-32
Total Indirect Savings	$ 53-98	$ 12-26	$ 63-132	$128-256
TOTAL POTENTIAL SAVINGS	$ 84-129	$ 29-43	$ 99-168	$212-304
COST	$ 4.3	$ 4.8	$ 6.7	$ 15.8
NET POTENTIAL SAVINGS	$ 80-125	$ 24-38	$ 92-161	$196-324

Each type of company has substantial benefits relative to its size. The direct savings alone are several times the annual costs for each participant. Distributors and manufacturers with annual sales of $300 million have the potential to save more than $500,000 annually. In summary, not only are the industry savings significant, but the savings to individual participants are significant as well. Based on the above projections the average company can save up to $1.60 per invoice and up $2.20 per purchase order.

Figures based on Arthur D. Little study of the grocery industry.

SOURCE: Sterling Software Brochure, "Electronic Data Interchange", 1987.

pressuring manufacturing."[124]

K-Mart began ordering electronically in 1976 and now has over 800 vendors on EDI. "There will come a point in time at which it will become a requirement," says Gary Sweetapple, Senior Director of Corporate Systems Development for K-Mart.[125]

Garan's McClosky describes the pressure as follows:

> We have actually gotten letters saying, "We need to send orders to you electronically, and if you can handle this, we'll look favorably on you." Which basically means, "Either be able to do this or we'll take our business elsewhere."[126]

What is the Impact on Employment?

EDI in the distributor/supplier connection means data entry job loss. Says Klima of Super Valu:

> We definitely know that the data entry positions at the "back-door" of the [local supermarket] are on the way out. The stores should be virtually data-entry free. The technology and feasibility of it are obtainable.[127]

When asked what would happen to all these people, he replied, "What happened to all the people who made horse buggies and whips? They all got jobs somewhere else. The system changes."[128]

If clerical positions similar to data entry are available elsewhere in the company, the displaced keyers may be able to be absorbed. Garan's McCloskey says:

> In our company there is probably about 25% less keypunching being done. We had four keypunchers and now we have only two. They were transferred to another department where they key other types of things like reports or order analysis data.[129]

A similar effort was made at Kroger, according to Morehead:

> We had eliminated keypunch staff in divisional offices several years ago with other systems, such as accounting systems. We tried to work the data entry people into other parts of the business. There is no such thing anymore as a data entry department. Almost everybody has a CRT.[130]

Job loss can also be absorbed -- and hidden -- by relying on turnover among employees. General Foods has been able to handle the need for different skills among their EDI-using Customer Service Coordinators "by attrition, retirement or early retirement," according to Kosy.[131] Echoing Kosy, Klima of Super

Valu says, "Nobody is let go. The attrition rate is sufficient."[132]

Loveland Pet Products of Loveland, Ohio, has supplied more than 20 of their customers with calculator-sized computers which can be held up to a telephone receiver or attached to a tiny modem to transmit orders. Loveland's salespeople also use these devices to transmit orders to the central computer. President of Loveland Pet Products, Roger Johannigman sees the workforce impact as "quantitative":

> In the long run, you need fewer people [in data entry]. We did not have to lay people off because of our growth, but we have not had to hire new ones. Our business has grown 20% a year.[133]

In this case the need for layoffs was obviated by sufficient increases in the volume of business. What would otherwise be a need to hire more staff is offset by the labor savings of EDI. Similarly, "when invoices come back to Kroger, if we didn't have [EDI], we would have to put additional people in the accounting area," says Morehead.[134]

What is the Impact on Job Skill Requirements?

With EDI at their disposal, customer services may become more elaborate in ways that leave data entry jobs far behind. Karklin-MacLellan-Harris, Inc., a food broker, formerly had a Data Processing Department with three keypunch operators. Since the introduction of EDI, they now have more customer service representatives with computer terminals on their desks. Gabriella Havasy, the Controller, found that the customer service position

> requires a different educational level, a more educated person. The job demands unique skills: a combination of imagination and discipline, independent thinking, self-teaching skills. The training and supervision is also difficult and you need a different level of person in that position. You need an educator, a trainer.[135]

The department attempted to retrain the keypunch operators, but "it was an absolute nightmare. Clericals cannot be retrained," contends Havasy.[136]

The brokerage terminated the data entry personnel and hired customer service reps from outside the company. Havasy says, "We needed a different level of person, smarter and higher grade."[137]

The experience of this food broker is corroborated by others. Hiring practices for Customer Service Coordinators at General Foods now specify at least a Bachelor's degree. "We have

Customer Service Coordinators with MBAs and Master's degrees. Before [EDI] we were hiring for the basic skills of a clerk," explains Kosy.

> Now with the time saved by [EDI], the Coordinators can look at other distribution systems and at price variances. The older ones were order entry clerks. Among the older employees, acceptance of the electronic environment is difficult. If they don't work well with [EDI], they may be assigned to non-[EDI] accounts. No one has been fired.[138]

Proctor and Gamble anticipates a similar transformation to jobs where people are "truly sellers, not order takers," says Gerry Mungan, Network Project Manager, in Cincinnati. "We anticipate that we'll need fewer order people. But we'll be shifting people from the order-taking area to other areas, such as handling distribution and promotion efforts."[139] However, Mungan does not foresee the need to replace the current staff with hirelings from the outside. "The training with the new system has been sufficient," he says.[140]

Even when the order handling position does not take on new service responsibilities, order problems may require additional skills to solve. Morehead explains, "If there is an error, some research has to be done to determine why that didn't get out. They have to learn more about the PC application, they have to pick up more analytical skills."[141]

Klima summarizes, "Data entry positions will have to be made into higher positions."[142]

Summary: The Distribution/Supplier Impact of EDI

EDI brings clear advantages to companies -- especially those which convince an adequate volume of their business to invest in a comparable system. Textile magnate Roger Milliken claims, "This is the beginning of a revolution in our industry."[143]

As EDI is developed to handle additional types of business transactions, its employment impact widens. According to George Klima at Super Valu, the ultimate outlook of EDI is, "1984...without the negatives, I hope."[144]

The Shipper/Receiver Connection

Transportation companies are realizing the potential of EDI for quicker processing of orders and the ability to track a shipment at a moment's notice. The possibility for electronic funds transfer is considered to be just around the corner. With EDI increasing the speed of the cash flow, an electronic funds transfer option would improve monetary transactions

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significantly.

What are the Benefits and to Whom?

The most important benefit to employers from EDI is the elimination of duplicative work. In the past, data entry clerks at the shipper entered orders into their system. The shipping order was then processed into a "hard copy" and sent to the transportation company. Upon receiving it a few days later, the transportation company gave the hard copy to **their** data entry department to enter it into their computer system. This second order entry step is eliminated by EDI, to the benefit of the transportation company.

In addition, transportation companies using EDI find that the amount of time it takes to generate a freight bill and have it mailed is reduced from days to mere minutes. Large companies would like to turn this advantage into a customer requirement. Chet Osinski, EDI Operations Analyst at Conrail, claims, "Some day it is going to come to the point where you have to use EDI if you want to use Conrail."[145]

However, in some cases it is demand by large customers that is spurring the adoption of EDI. Menth of Target Stores says:

> It was a direction that Target wanted to go. We took the existing carriers and said that you have six months to be able to do this [transmit via EDI] and if you don't...we'll go find someone else. I don't think a carrier will be able to survive without this technology.[146]

No matter who claims responsibility for motivating the implementation of EDI, the transportation industry has invested heavily in this area of technology.

Only a very small percentage of a company's customers, often less than 1%, will be using EDI when the system is first activated. However, that 1% is almost entirely made up of volume shippers which may account for a significant portion of a transportation company's business. Of Conrail's 20,000 customers, only 100 participate in EDI, but those 100 shippers make up 20% percent of Conrail's intermodal carrier volume. As an incentive, Conrail offers guaranteed rates for their volume shippers if they become part of the EDI network. Chet Osinski of Conrail believes that they will have increased the number of customers using EDI "by 100% before the end of next year."[147]

What is the Impact on Employment?

With EDI, the data entry department in the transportation company can be virtually eliminated. This is advantageous for the transportation industry but, unfortunately, not for the people who worked in now defunct data entry departments.

"We have about 130 people doing bill entering...we're going to have to eventually begin cutting," says Chet Osinski of Conrail. He speculates that EDI will have its ultimate effect in about 10 years. "This is the way you're going to do business. The railroads are looking to go completely paperless," he says.[148]

Jones Transfer, a large national trucking company, has been working with EDI for several years. Terry Hayes, Terminal Manager of Jones Transfer's second largest terminal located in Cleveland, has no doubts about the trend in today's data entry positions.

> We don't expect that position to be viable after the next five years. We have six or seven people [in our data entry department] and we hope to have none. This is a union environment and they're getting top wages and benefits. Other companies are paying four or five dollars per hour while we're paying over ten. If we want to stay competitive we have to go to this computer system.[149]

The Santa Fe Railroad, another EDI user, foresees the same development. Fred Mills, Project Consultant at Santa Fe says, "We do a lot of duplicate entry and we're trying to get rid of that."[150] Santa Fe has about two hundred people in their data entry department in Topeka, Kansas. Fred Mills believes that this department will be cut by as much as 10% each year over the next several years.[151]

It appears from several interviews that most workforce reductions will be attempted through attrition. This is accomplished by relying on the high rate of turnover. However, some companies moving more quickly with their EDI systems choose not to wait. When asked whether attrition would be the primary method of phasing out the data entry department at Santa Fe, Fred Mills replies, "I'm afraid it's going to be much more severe than that. There will also be a lot of support jobs that we'll be rid of. Middle management and programmers...they just won't be needed anymore."[152]

What is the Impact on Job Skill Requirements?

There is some indication that a new occupation is being created by the new technology. Rather than just keying in batches of information, the employee would be responsible for checking the incoming information and being a trouble-shooter for the EDI system. For example, a bill of lading that does not, for whatever reason, fit the system format would be downloaded to the person who would solve the "system error."

This position will require greater qualitative reasoning and problem solving skills than the former data entry position did. Ray Cully, Manager of Commercial Services at LTV Steel in Cleveland, set down some educational criteria for this new, as yet unnamed, position:

> This will be an analytical position. This person must be able to communicate in order to solve the problems. The person doing this job will need (1) **computer systems skills**, (2) **communications skills**, and (3) **general business skills**. This will probably be a college-educated person.[153]

Cully believes that this position is unique in that, unlike the traditional data entry clerk, the job will lead to promotions within the company. However, this does not mean that data entry clerks will move into these positions. Unfortunately, these positions will be limited to what the industry considers to be better qualified people.

In some cases, the workers in the path of EDI do not lose their jobs. Jones Transfer, for instance, is making an effort to retrain employees being dislocated. Terminal manager Terry Hayes believes that implementation of this technology will enable Jones Transfer to grow, and a growing company will need experienced employees.

> We hope to retrain these people. As we grow we'll have need for these people elsewhere. We'd like to see everyone retire from here. We're a family oriented business with people who have brothers and fathers working here. If we layoff one guy, we affect two others.[154]

Summary: The Shipper/Receiver Impact of EDI

EDI will allow a significant number of data entry positions to be replaced by new office technology, in particular the positions involving duplicative work. The BLS projects a 31% decline in the number of data entry positions available in the transportation, communication, and utility industries by the year 2000. In addition, related job titles such as bookkeeping, accounting, auditing clerks, and customer representatives will experience a 4% decline. A 5% drop is expected for billing cost and rate clerks. These percentages can be expected to further decline with the accelerated adoption of EDI. The BLS also predicts a 2% increase of first-line supervisors and managers; however, interviews with company managers indicate a potential decrease in lower-level management as the number of clerks to supervise diminishes.

The Insurance/Medical Connection

Hospitals, medical clinics, pharmacies, and doctors' and dentists' offices are rapidly moving toward the use of electronic claims submission (ECS).

Most computer systems for medical offices have ECS capabilities. Digitized claims information is transmitted through telephone lines either directly to insurance carriers or to third-party clearinghouses, such as National Electronic Information Corporation (NEIC), which edit and format the information so that it is readily acceptable by the insurance carrier. NEIC distributes claims to nearly forty insurance carriers, which represent "over 85% of the group insurance business in the country," performing its edits overnight so that claims are received by carriers within 24 hours.[155] Some major insurance carriers and clearinghouses are preparing for electronic funds transfer so that claims payment can be as paperless as claims submission.

General Computer Corp. of Twinsburg, Ohio acts as a clearinghouse for claims from pharmacies, in addition to providing pharmacies with other systems capabilities. Pharmacies may send claims information through telephone lines, on diskette or tape, or even on paper; checking patient eligibility, formatting and transmitting to the appropriate carriers is carried out by General Computer. New software dubbed "CashFlow" allows General Computer to act as the disbursement agent for claims payments, using electronic funds transfer to deposit payment in pharmacy bank accounts.[156]

What are the Benefits and to Whom?

First and foremost, the insurance carriers benefit. Dick Wheeler, Manager of Electronic Claims at Blue Cross/Blue Shield (BC/BS) of Toledo, describes the benefits as two-fold: the information received is more accurate and consistent, and it **does not have to be keyed**.[157] Furthermore, according to Bill Parsons, Manager of Electronic Claims at BC/BS in Cleveland, there is a reduction in payment of fraudulent claims, and the business relationship with the provider is enhanced.[158]

Because of these benefits, BC/BS is actively encouraging the use of electronic claims. The Cleveland office provides **complementary** software for use on the PCs of "low-end users" such as doctors' offices. Margaret Hayes, Business Office Manager of St. Luke's Radiology in Cleveland says there is a "big, big push for electronic claims by insurance carriers."[159] Wendy Golenberke, who handled the computer systems in a radiology office, says that Blue Shield is "requiring electronic claims use by providers."[160] Wheeler denies that medical providers are forced to give up paper claims, saying that BC/BS uses "just

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positive incentives."[161] However, marketing literature for pharmacy ECS maintains, "Third-party payers have begun notifying the pharmacy profession that in the near future third-party claims **must** be submitted in specific electronic forms" (emphasis in the original).[162]

The primary benefit of ECS to medical providers and pharmacies is lower receivables -- in other words, claims payments are received faster. The benefits to the insurance company in accuracy and in elimination of rekeying are that "throughput rate is much better," says Parsons of BC/BS-Cleveland. He claims that doctors' offices experience a 75-80% reduction in payment time.[163] According to Hayes, whose office handles a big volume of x-ray claims:

> There is a savings from the Ohio Department of Public Welfare -- the turnaround time [for ECS] is two weeks, where it was four to six weeks before. Medicare now takes ten days to two weeks; with paper it took three to four weeks.[164]

For hospitals, the receivables savings are even more significant. Southwest General Hospital in Middleburg Heights, Ohio now receives payment on 30% of its claims within three days using ECS, compared to 120-day average turnaround time on paper claims, according to Parsons. One day's savings in receivables justified the cost of the system for the Cleveland Clinic, which submits $250,000 worth of claims to Blue Cross daily. Parsons estimates that hospitals can now process 90% of their claims electronically by using ECS to BC/BS, Medicare, and Medicaid directly, and to other insurance carriers through third-party clearinghouses.[165]

Medical providers also benefit from reduction in the labor-time required for ECS compared to paper claims, though the extent of savings is a matter of discussion. Questioning BC/BS's promises of substantial labor savings, Hayes says, "There is not much labor savings, except for the separating and mailing [of paper claims]. The system provides the patient's account number -- that saves labor." However Hayes admits, "Our business has grown considerably. We are running the office with three people and we have been able to handle a big increase in business volume without adding staff."[166] The scale of hospital operations and the retention of patient data on mainframe computers allows for even greater savings.

What is the Impact on Employment?

Electronic claims eliminate duplicative data entry at the insurance company. As of December 1988, BC/BS-Cleveland was receiving 47% of the claims from doctors' offices and 58% of the claims from hospitals in electronic form, up from 24% in 1987.

In spite of this rapid changeover in transaction technology, Bill Parsons says that BC/BS will not need to resort to laying off claims processors:

> The natural attrition rate is 10%. We will simply allow positions not to be filled.[167]

Parsons asserts that "reduction in time at the doctor's office is 60%."[168] Similarly, Dr. Florante Baldado, a family physician in suburban Cleveland, affirms that his ECS system

> makes the office very efficient -- you don't have to have four or five assistants to help out with this system. Right now, I'd need a minimum of two assistants if this system didn't free me from so much typing, so much repetition.[169]

Dr. Baldado foresees use of a system like his by semiretired physicians without office assistants. "Anybody can do it, even a doctor," he says, adding that his assistant, Kati Schoenstein, has not completely trained him on the system. "And I won't," replies Schoenstein. "It's called job security."[170]

Hospital labor reduction is more dramatic by far. Parsons describes the hospital-based ECS job as follows:

> Patient data is downloaded from the mainframe, run through a couple of filters, and edits are applied. It requires only one person working a couple of hours a day making corrections. It eliminates full-time equivalents.[171]

What is the Impact On Job Skill Requirements?

At Blue Cross/Blue Shield the job skills of claims processors are not altered by ECS. Correctly formatted electronic claims bypass the Claims Department and go directly into the claims payment system. If there are any problems with the information, the claim "suspends," and the problem is straightened out by the Claims Department as if it were a paper claim. "'Suspends' look the same to the claims processor as claims that were keyed from paper submissions," says Parsons.[172] In either case, no new skills are required of the claims department employees in order to handle electronic claims.

ECS prompted the formation of Electronic Claims Departments at BC/BS. In Cleveland, for example, this department is comprised of sales staff and support staff. The support staff includes a programming staff of six to eight employees, and research and development staff who examine new technologies, as well as clerical staff. "All staff members came from other parts of the company and were retrained hands on," says Parsons.[173]

At the office of the medical provider, there should not be additional skills required beyond basic computer knowledge. According to Parsons the software that BC/BS offers should simplify the job.

> It requires less rote memorization of codes, and help screens are available with any information needed. Doctors' offices would not have to change over to other [more technically skilled] staff. We've rarely seen that. Massive retraining and bringing in people from the outside are not necessary in the health-care business. There is a steep learning curve.[174]

Medical Payment Systems, of Westlake, Ohio, offers a device which reads patient data from magnetically-encoded plastic cards, transmitting claims information electronically without the need for a computer. In terms of skill requirements, a marketing representative for MPS says, "If they have a mind they can do it."[175] MPS has installed more than 800 of the devices in the Cleveland area.

Summary: The Insurance/Medical Impact of EDI

The insurance/medical provider connection is one in which electronic exchange of information can be expected to spread rapidly, due to financial benefits on both sides. However, natural workforce attrition and increased business volume without accompanying increases in employment may disguise the resulting job displacement.

Conclusion

The introduction of EDI is a gradual, but inevitable, development with far-reaching impact. The manufacturing, wholesale and retail industries, as well as the insurance, health care, and transportation industries are already profiting by doing business electronically. Victor Wheatman, a market researcher in Mountain View, California, estimates that there are about 3000 EDI users in the United States today. By 1992, EDI will be a $1.9 billion business, Wheatman predicts.[176]

One of the primary benefits to employers is the elimination of redundant data entry positions. As more of data entry can be shifted to the company that initially enters the data, the duplicative positions at the other end are being reduced. We expect this elimination to be almost 2% per year, or 27% by 2000 -- exceeding official forecasts.

A new class of higher skilled workers will evaluate incoming data that has been previously keyed in. This new position will require a higher degree of education than has been previously expected. John Witten of DNS Associates, translation software

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specialists, believes that industries will need a higher-skilled worker who will be "adding data to existing data. This is a new job that will take more smarts than just 'key what you see.'"[177]

A common belief is that new industries rising out of this new technology will help cushion any clerical job loss in other industries. However, this has so far proved to be unfounded. The only new industry that has arisen as a result of electronic data interchange is the translation software industry. When asked how many clerical/data entry positions his firm employs, Witten of DNS Associates emphatically replies, "Zippo. This is an information processing business we're in. Software houses and middle-men (EDI networks). The number of people who process information is declining rapidly."[178] Thus, the suggestion that displaced data entry workers will be neatly shifted to new industries does not appear realistic.

Future developments are expected to take place in cross-industry EDI and the combination of electronic mail (E-mail) and EDI. Cross-industry EDI will allow dissimilar industries to communicate data. Because of the low volume of transactions, EDI across industries was not a prime objective while companies were setting up their systems. As more companies move into EDI, the desire for electronic cross-industry data communication will grow. "The combination of EDI and E-mail will be due more to the blending of services rather than an actual deliberate effort," says Rose Hayden-Smith, Public Relations Manager at McDonnell Douglas Information Systems.[179] Companies interested in only one area of information exchange will soon be able to carry out other functions as long as they are hooked up to the network.

The removal of data entry positions with the advent of office automation **within** organizations is now also becoming possible **between** organizations that interact. As EDI spreads, data will increasingly be captured at the point of origin and there will be a decreasing need for repeated keyboarding. The employment impact of EDI is already apparent in electronically linked organizations. As major employers increase their volume use of EDI, significant displacement of data entry workers will be experienced.

CHAPTER V:

POLICY CHALLENGES: ALTERNATIVES TO DISPLACEMENT

Policies must be enacted to prevent the introduction of new technology from resulting in technological unemployment. This is particularly urgent for women and older-aged clericals, who are often not retrained for upgraded job tasks. Six necessary steps include:

1) *requiring advance notification of impending dislocation -- not just for large businesses or closings affecting sizable numbers of workers, but also for smaller companies or departments within companies, to reduce the hardship of service sector displacement;*

2) *elevating retraining and continuous training in the private sector to a higher priority, rather than needlessly allowing new technology to result in displacement or dislocation;*

3) *promoting and expanding government-sponsored training programs, either by extending JTPA programs to those currently neglected, such as older and less-educated workers, or financing individual retraining accounts through reforms in the unemployment insurance system;*

4) *granting more voluntary transfer and reassignment rights to dislocated workers within a company;*

5) *actively encouraging the adoption of job security initiatives and union contract provisions which establish guaranteed employment levels or require upgrading of clericals in the face of job upskilling;*

6) *encouraging more employer subsidization of employee development and career advancement through general education at local colleges; and creating customized training of entry-level workers for known, existing job openings.*

Avoiding Displacement When Technology Is Introduced

Technologies that eliminate redundant clerical work usually cut out steps in the work process, which employers often see as an opportunity to shave personnel costs. But advances in technology do not necessarily have to result in displacement and unemployment. Employers could choose to follow options that benefit both workers and the employer in the long run. There are a whole host of successfully implemented policies to avoid layoffs when technology or automation is introduced.

The displacement effect of any new technology depends on **the environment to which it is being introduced**, specifically the terms of union contracts or job guarantees in personnel handbooks. Companies should deploy a "high job security/low turnover" strategy, which either explicitly or implicitly guarantees employment or job security. As a basic minimum standard, companies should continue to use planned attrition in order to minimize sudden layoffs.

Whether workers are laid off or retained in some other capacity has all too often been based on gender -- in other words, discrimination. Workers displaced by technology in manufacturing establishments -- mostly male -- are frequently transferred laterally (i.e. without demotion). In the office, companies typically train men but not women for the new **upskilled** jobs generated by office automation. Women often wind up taking the **deskilled** jobs eschewed by men in the office.[180] Lateral transfer or upgrading policies used for men should be followed for women as well.

Layoffs have also been avoided through increasing the use of temporary employees and overtime, which restricts the expansion of permanent staff.[181] This is an undesirable alternative, since it merely shifts the burden of dislocation onto those compelled to work temporary jobs.

The following measures must be adopted immediately in order to avert the potentially dire consequences of the recent wave of new office technologies:

(1) Labor Legislation Reform: Advance Notification Of Layoff

Under the newly passed federal Workers Adjustment and Retraining Notification Act (WARN) or plant-closing law, effective February 4, 1989, companies will be required to give 60-day notice to workers and communities when announcing layoffs, hours reductions or the closing of a facility or "operating unit." While this is an important first step, some of the restrictions contained in the law limit its application to service sector displacement: companies with fewer than 100 full-time employees are exempted from the law; layoffs requiring notice would have to involve 50 or more workers at one site, or 50 or more workers overall if that constituted at least one-third of the workforce, or 500 workers, even if less than one-third of the workforce. Employees in small companies or worksites would not be protected.

The AFL-CIO estimates that the law covers only 2% of U.S. employers.[182] Similarly, a department or specific job title could be entirely eliminated without triggering the provisions of the law. In order to soften the blow of service sector displacement, WARN needs to be extended to companies with fewer than 100 employees and to layoffs affecting fewer than 50 employees.

Sudden, unanticipated layoffs at the introduction of new technology are inhumane. An Emery Worldwide clerical worker in the Dallas area had a typical experience:

> When she was called in, she waited four hours in a waiting room without pay. She was then told she had to make up her mind right then and there: 1) severance pay without recall, 2) lay off without recall, or 3) go to part-time. She couldn't even call her husband. They had to know right then. She said, "I have a family and we need the money, so I took the part-time work. Then I had to go back to work just shaking. I was so upset I couldn't even write."[183]

It is good economic and social policy to require advance notification. Evidence shows that chances of reemployment are increased while the length of unemployment and hardship of unemployment are reduced if a worker has a chance to prepare him or herself by seeking reemployment, retraining or employment services. According to the U.S. General Accounting Office, less than one in ten establishments give notice three months or more in advance, as displayed in Figure 5.1. Figure 5.2 shows that only a small minority of firms offer assistance to their displaced employees, aside from aid in job search.

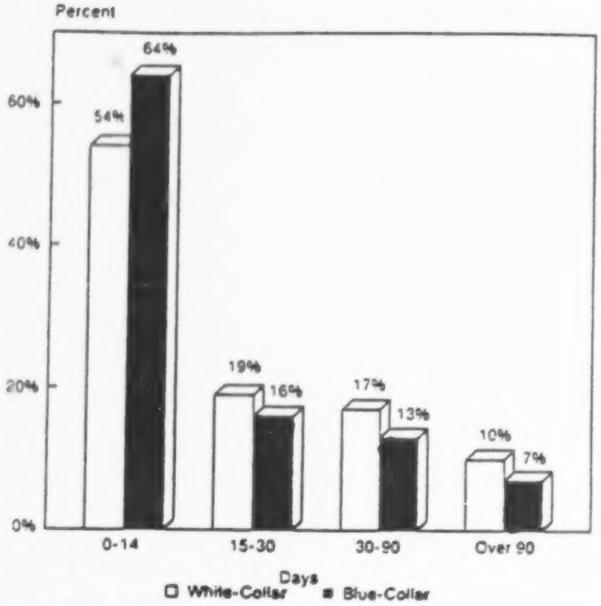
Advance notification complements other methods of discouraging complete closing of worksites -- including severance pay, extended health benefits and indemnification payments to the affected community.[184] Substantial **compensation** should be required for workers whose positions are abolished, so that firms share the costs of displacement -- since workers bear the risk of total income loss and devaluation of their entire stock of firm-specific skills and knowledge.[185] Compensation is really the only recourse for those 20-30% of displaced workers who lack even the basic skills to make retraining a viable option. Figure 5.3 shows that only slightly over one-half of white-collar workers receive severance pay, and undoubtedly these are mostly management level employees.

(2) Greater Private Sector Retraining Efforts

> The necessity for constant learning and constant adaptation by workers will be a certain outgrowth of technological innovation.[186]
>
> William B. Johnston

FIGURE 5.1

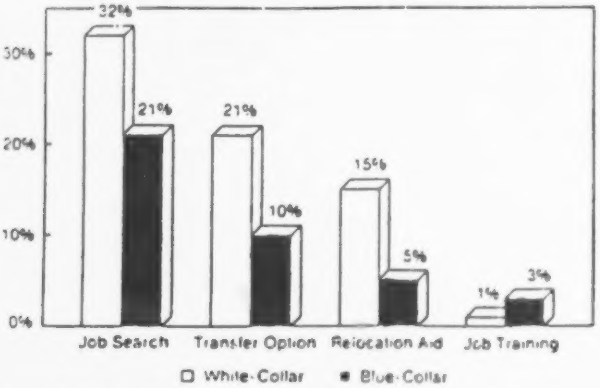
Percent of Establishments Providing Advance Notice of Plant Closing or Mass Layoff



SOURCE: General Accounting Office.

Figure 5.2

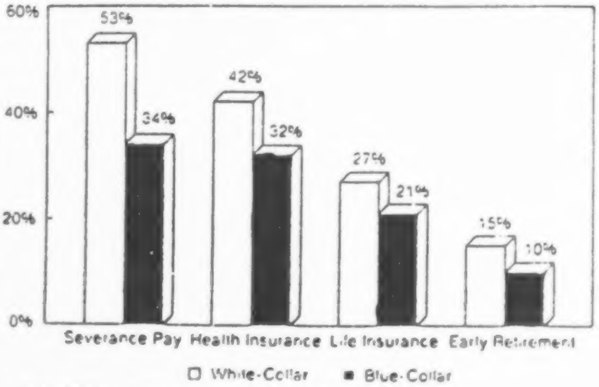
Percent of Establishments Offering Placement Assistance



SOURCE: General Accounting Office

Figure 5.3

Percent of Establishments Offering Financial Assistance



SOURCE: General Accounting Office.

The National Commission on Employment Policy estimates that through the rest of the 1980s, 400,000 workers per year will require extensive retraining in order to find new jobs.[187] Between 60% and 75% of the workers who will be employed in the year 2000 are at work now and therefore are not likely to receive additional skills from formal schooling. If displaced workers are to get the new, more technical jobs being generated by automation in office work processes, they will have to be retrained.[188]

The private sector must contribute more to the massive retraining effort needed as new office technology spreads. Retraining of clericals -- displaced or employed -- has so far been a very low priority for businesses. Employers considering cost-reduction measures too often make short-sighted management decisions to cut their training budgets.[189]

Clerical workers receive little training time and expense in comparison to management and technical employees. While middle-level managers received 32.5 hours of training on the average for one year, clerical workers got an average of 11 hours a year.[190] Only 4% of all secretaries nationally received formal company training, compared to 27% of computer systems analysts and 30% of operations and systems researchers and analysts.[191] A Working Women Education Fund survey in Ohio revealed that of 500 clerical workers in the state, only 36% were even aware of any company sponsored retraining programs.

An ITT Education survey of Fortune 500 companies found that 44% of companies were more likely to hire new workers rather than retrain workers, in spite of the substantial hiring and training costs for a new employee.[192] Only 36% said that they had switched employees into positions that required additional training. Jerome Rosow of the Work in America Institute states in a 1987 report that, "In case after case employers discover, too late, that in the process of getting rid of employees who lack necessary new skills, they have lost other equally essential assets such as stored know-how, experience, flexibility and institutional memory. Often the costs of retraining may be lower, and the costs of dismissal higher, than appears on the surface."[193]

The response of most firms to technological advance and skill upgrading has been to raise hiring standards rather than to undertake more training and retraining of its workers. Private companies have shed much of the burden of skill formation of the work force, transferring it onto the educational system. This is connected to the on-going dismantling of traditional "internal labor markets" -- where firms trained and promoted their workers internally in order to fill vacancies up the job ladder.[194]

There are some companies which understand the benefits of retraining, however. Positive examples of new private sector office worker retraining efforts include:

- Polaroid's "Technology Readiness" programs which teach everything from remedial education to higher math and science.[195]

- "Education franchises" or "educational service outlets," which train non-professionals for a fee. The Teller Training Institute, for example, sells franchises that train bank tellers. (Banks blame their reluctance to spend the $2000 or so necessary to train their own tellers on the high, 36% turnover rate per year.)[196] The cost of enrolling in these training schools could be declared tax deductible, in order to encourage workers to take on the sometimes prohibitive outlays to attend.

(3) Government-Sponsored Training And Retraining

The federal government is not doing enough for workers who are affected by technological advances in the office workplace. The Job Training Partnership Act (JTPA) program, despite its high placement rate of 69% of its trainees, simply does not extend far enough -- reaching only 7% of the 2.2 million workers a year who are displaced.[197] From 1978 to 1986, federal expenditures (in constant dollars) on training and employment **dropped** 68%. JTPA is sorely underfunded and lacks income support during training. Moreover, mainly because of funding requirements placed on local program administrators, it emphasizes immediate placement over longer run solutions to worker displacement.

Programs should be providing displaced workers with a range of skills, so as to avoid dislocation in the future. Although better than nothing at all, JTPA programs run through local community and technical schools tend to provide more narrow, machine-specific skills.[198]

- The federal government should expand the inducement for private firms to invest in training, through the Employer Educational Assistance Act, which totalled less than $25 million in fiscal 1986. (In contrast, tax incentives for plant, machinery, and R&D investment spending amounted to $80 billion -- $3200 for every dollar of incentive to invest in training.)[199] A Block Investment Credit which gives businesses the choice to invest in worker training or skill upgrading -- or in modernized machinery -- would narrow the gap between investment in machines and workers.[200]

- The state or federal government should adopt a system of individual training accounts, from which workers could pay for retraining. Accounts would be funded by tax deductible contributions from both workers and employers. Upon displacement, funds in the individual's training account could be used as vouchers for training, education, and moving expenses.

A less costly system, focused on displaced workers rather than all workers, is Retraining Risk Protection (RRP). Funded by employer and worker contributions through Unemployment Insurance (UI) taxes, displaced workers could withdraw from their RRP accounts when their reemployment prospects are low, to help finance retraining or further education.[201]

o The state's UI system should be used to promote more training and retraining opportunities. The UI payroll tax mechanism could be used to channel funding into programs such as wage subsidies, retraining sabbaticals, and a lump-sum benefit at the onset of unemployment in order to encourage self-employment.

A little-publicized amendment to the federal Unemployment Insurance Act passed in 1970 permits workers to enroll in training without denial of benefits, rather than waiting to enroll until after benefits are exhausted. Only nine states have expanded the scope of retraining arrangements since the 1970 amendments.[202] Other states should follow the lead of Hawaii, West Virginia and Massachusetts and extend UI payments to those unemployed who enroll themselves in vocational or post-secondary education to upgrade their skills and knowledge.

o States should allow their UI funds to be earmarked for training and retraining of unemployed or soon-to-be unemployed workers. California's Employment Training Panel gives credits toward employers' unemployment insurance contributions to companies providing retraining. Delaware established a permanent $1.5 million training fund, using a special tax.[203] California implemented the same tax while reducing the UI payroll tax, to raise up to $55 million annually for retraining.

o The federal government should provide direct loans or loan guarantees, administered by state or local authorities, to workers displaced by technological change to finance retraining, relocation, or starting new businesses.[204]

o Older-aged workers in particular would benefit from: 1) evaluation and expansion of the model "3% set-aside" programs, where JTPA funds are used exclusively for workers aged 55 and over; 2) expanded funding for displaced homemaker networks, which assist middle- and older-aged women in reemployment efforts after a long absence from the labor force, including training in of various job skills currently in demand.

Policy needs to be addressed selectively to those specific occupations adversely impacted by technology. In addition, we

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need a **permanent** policy body not only for research on the impact of labor-displacing technology, but also for assistance in re-channeling investment into new types of retraining. Why continue waiting until **after** automation yields mass displacement within occupations when much of it is avoidable?

(4) Alternatives To Layoffs

Greater efforts need to be expended to maintain job or employment security. The following are examples of ways to avoid layoffs, which could be used in conjunction with retraining the workers involved:

o Grant voluntary transfer/reassignment within or to a new department to all employees affected by technological dislocation. For example, even though Capitol Holdings' data entry department was reduced by 75%, the employment security of its data entry operators were not threatened, since they were placed elsewhere within the company.[205]

o Allow employees to volunteer for permanent part-time positions or job sharing, **without** any accompanying loss in hourly pay, benefits, or seniority status.

o Reduce work forces gradually through "planned attrition," without disruption and with planned changes announced well in advance of implementation.

o Minimize the use of overtime hours, creating additional positions instead. There are too few examples of companies reassigning data entry operators to new, comparable jobs within the company -- without loss of previous status.

Possibilities for voluntary reassignment and transfer are restricted in small businesses. Retraining for upgraded positions is crucial to prevent job loss in small enterprises and in industries where clerical positions are disappearing rapidly, such as insurance.

(5) Job Security: Unionism and Innovative Contract Language

Early union policy stressed preventing technological unemployment through reducing hours of work.[206] With the recognition that automation was eliminating lower-skilled jobs and generating new higher-skill jobs,[207] the percentage of collective bargaining agreements containing provisions for on-the-job training began to increase, rising from 12% in 1966 to 40% in 1980.[208] These provisions commonly call for company-sponsored, on-site training programs for both the displaced worker and those currently employed.[209]

Office automation became a more central issue to unions in the 1970s, as the percentage of union members who were white-collar increased from 23% to 35% between 1970 and 1980.[210] Some unions began to establish contract provisions to prevent displacement by office automation. However, the overall percentage of workers covered by collective bargaining has declined through most of the 1980s. A major stumbling block to maintaining or raising unionization levels has been the growing predominance of small businesses, which are heavily nonunion.[211] The recent massive downsizing of white collar and administrative staff could not have taken place without the absence or weakened presence of unions.

There are, however, several examples of office workers protected from technological displacement through innovative contract language or other proactive union involvement:

o The Service Employees International Union (SEIU) has model contract language to help its locals establish joint labor-management committees. The purpose is to develop and implement employee development and career advancement through education funds, internal promotion and transfer agreements, advance notification, and job retraining and upgrading in response to technological advance and automation.

SEIU's LEAD (Lifetime Employment and Development) program has helped develop job ladders for clericals. SEIU Local 767, for example, with Cape Cod Hospital set up a joint labor-management committee which facilitates clerical upward mobility within the hospital by providing opportunities for on-the-job training or other job-related education.

SEIU District 925 members working at Cuyahoga Community College in Cleveland, Ohio are entitled to tuition reimbursement for courses taken at the college as well as some release-time from work. The union also helped establish a "training bank," where full-time workers with at least five years service can accumulate credits to fund their training after they have left their positions.

Finally, SEIU Local 715 won paid leaves of absence for Santa Clara County employees to obtain training on new automated equipment.[212]

o In one of the earliest negotiated provisions, the Office and Professional Employees International Union's 1978 contract with the New York Stock Exchange set up training and transfer rights for employees displaced by "data processing equipment, computers, or automated services or systems."[213]

o The Communication Workers of America (CWA) contract with Ohio Bell stipulates that six months' advance notification must be given prior to dissolving jobs in the bargaining unit. The system of early notification induces the company to plan any downsizing well in advance, so it can be accomplished through attrition -- including quits, retirements, and voluntary transfers to other openings. The Cleveland Residence Services department, for example, was reduced from 280 to 200 over a two-year period, all through attrition.[214]

Service representatives and order typists all over the state of Ohio have been given **two years** advance warning on job elimination. Technology that will allow on-line service order-taking is eliminating the job of the order typist and indirectly cutting the demand for service representatives, due to greatly reduced paperwork involved with orders. CWA Local 4309 has been training its members on test-taking skills to increase the chances of order typists attempting to qualify for higher skilled positions. The union also identified clerical jobs that were being filled through temporary agencies and had those converted to permanent positions into which order typists could transfer. By having a long lead time, reassignments within Ohio Bell have been found for most of the service representatives and order typists being dislocated.[215]

In addition, Local 4309 discovered that clerical jobs were being cut because new spreadsheet software was enabling managers to perform work that, although not specified contractually, had in "past practice" been part of clerical duties. After CWA filed grievances for each clerical whose work was being pirated, Ohio Bell eventually agreed to train the clericals to produce the spreadsheets, thereby saving many jobs.[216] (This is a classic case of the job impact being determined by how the technology is **applied**, not just by the technology itself.)

Finally, CWA Local 4309 also has successfully negotiated contract provisions for retraining both surplus and potentially surplus employees -- which includes virtually everyone.[217] One program reimburses employees for tuition costs for any course taken -- job-related or otherwise. A program called "future tech" allows selected employees to enroll in an electrical engineering program at Cuyahoga Community College to begin a four-year degree program to be finished elsewhere, with all expenses paid and work-time excused. A "pre tech" program is available for those who did not initially qualify for the future tech plan, allowing them to enroll in college level classes to prepare for more technical courses later. Although there is now a nationally established retraining program through AT&T's "Alliance for Employee Growth and Development," one needs to be directly impacted by technology in order to qualify for its paid enrollment in accredited schools and colleges. CWA Local 4309's retraining programs cover any employee.

o The American Federation of State, County, and Municipal Employees' (AFSCME) contract with the state of Ohio, covering

10,000 clericals and 37,000 total workers, requires 60 days advance notice of any new technological change which significantly alters job duties or job skills, or results in work force reduction. The state agreed to provide training and retraining during regular work hours to all affected workers, and to place those workers unable to complete the training into comparable jobs.

Employers are beginning to recognize that workers (and managers) will be unlikely to develop productivity-enhancing methods -- using new technology or any other new practice such as worker participation or team production -- unless their employment is secured. Some of the stronger industrial unions have been able to negotiate contract provisions for extensive employment-security where new technology and automation are being introduced.[218] The 1986 agreement between CWA and Pacific and Nevada Bell also guarantees no layoffs of the 67,000 covered workers over the three-year life of the contract.[219]

Some nonunion companies have established progressive, employment-guaranteeing practices. Citicorp recently introduced a new technology by first forming a team of affected workers to design the new work flow **before** the technology was set up, and the company guaranteed a job to all affected by the transition.[220] However, others such as Eastman-Kodak have abandoned or suspended such practices in light of speeded up competition and the introduction of new technology.[221]

(6) Employer Support for General Education

As the pace at which new technology is introduced into the office quickens, we need to invest more heavily in the education of both our current and our upcoming labor force. Even if companies respond to the imperative to initiate more training and retraining, workers will still need to have a broad enough education to be able to adapt to automated technology that is taking over some or all of their tasks (see Table 5.1). With educated, more flexible workers, companies will be more inclined to upgrade **workers** rather than just upgrade jobs.

Some companies have initiated investment in the education of their own employees, where "capital spent on people has paid off as much as or more than capital spent on equipment."[222] Progressive Industries, of Northwood, Ohio, a metal products manufacturer, invested $12,000-$14,000 over a year in education, by covering tuition and other expenses of its 29 hourly and seven salaried managerial employees. It paid off handsomely, since the skills and decision-making ability of its work force saves the company the cost of hiring additional managers.[223]

The next frontier in the education of the labor force is to

TABLE 5.1

THE OCCUPATIONS OF THE FUTURE WILL REQUIRE MORE EDUCATION

	CURRENT JOBS	NEW JOBS
8 Years or Less	6%	4%
1-3 Years of High School	12%	10%
4 Years of High School	40%	35%
1-3 Years of College	20%	22%
4 Years of College or More	22%	30%
Median Years of School	12.8	13.5

SOURCE: William B. Johnston, Workforce 2000: Work and Workers for the 21st Century, Hudson Institute, 1987, p. 98.

follow the examples of manufacturing sector firms, investing in workforce computer literacy.

In order to restore the basic and vocational education of U.S. workers, the following actions must be taken immediately:

o More support for adult education programs is needed, given the growing importance of basic skills and the high-paced infusion of technology. Improving access to and updating such programs is the first necessary step.

o Remedial education for the current and new force of workers must be stepped up if we are to overcome one of the most basic barriers to retraining office workers for upgraded positions or using new technologies.

-- AT&T invests $6 million annually in employee courses in basic reading, writing and mathematics, while the Polaroid Corporation provides remedial assistance for up to 750 employees a year.[224]

-- Younger people on public assistance are targeted by "70001, the Employment and Training Institute," operating in over 60 cities. It administers tests, provides job counseling, and offers remedial education, vocational and technical training, achieving a very high rate of placement into jobs or higher education.[225]

-- Oklahoma and South Carolina confront the problem of antiquated equipment and outdated faculty skills in their vocational schools, technical institutes and community colleges by buying or leasing state-of-the-art equipment. They operate equipment pools, rotating supplies between schools as needed.[226]

o Expand entry-level training programs. A number of states operate **customized training** for entry-level workers, which prepares them with the skills necessary to fill specific positions in particular companies.[227]

-- In Ohio, the Instant Response Training Network provides customized training by linking Ohio's Departments of Development, Education, and Employment Services with local schools, Private Industry Councils, and Ohio Industrial Training centers. Ohio has also invested $4.4 million into two-year colleges to make them more responsive to the needs of employers through the Productivity Improvement Program.[228]

-- Oklahoma also provides "pre-entry-level" training and remedial education to prepare those needing it for the entry-level training courses. Oklahoma's program costs only $272 per trainee.[229]

o National business organizations should increase the presence and capacities of NaCor (the National Center on Occupational Readjustment) to assist employers with worker dislocation issues.[230]

Additional Reforms

Several more general institutional changes must be set in motion to provide additional job opportunities and protection from displacement for clerical workers:

o The standard workweek should be reduced, in order to distribute a given workload among a greater number of employees. If the Fair Labor Standards Act was amended to define the standard workweek as 35 hours, additional clerical jobs would exist. Office automation tends to reduce the labor-time necessary to accomplish certain tasks or, as in the case of duplicative work, remove certain clerical tasks altogether. Reducing the workweek in the office would therefore help prevent these productivity gains from generating layoffs. If the productivity gain is translated into shorter daily hours, it would free up much needed time for predominantly women clericals to spend with children and family.

o Pay increases must accompany upgrading of skills or responsibilities on the job. Most clerical workers who have acquired new computer or office automation skills have not received raises or promotions. Only 4% of five hundred workers surveyed by the Working Women's Education Fund indicated that their wages had risen to reflect a change in the quantity and complexity of their work; two-thirds stated that their wages remained the same, and 69% claimed that their job titles had not been upgraded.[231] Another survey of 1,250 secretaries by Professional Secretaries International revealed that 58% of respondents received no pay gain as a result of acquiring the ability to use computers. A third were actually performing tasks formerly done by managers or professionals, yet did not receive pay or recognition for it.[232]

There is a strong disincentive for clerical workers to acquire more skills, since it does not appear to pay off. If pay increases were granted regularly for mastering new technology on the job, clerical workers would seek out more skills. In the process, clericals could become more flexible in the variety of tasks that they could perform, which would help protect them against layoffs when automation is introduced.

o Greater worker participation in decision-making must be initiated. In order for workers to broaden their skills and to

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embrace more complex job tasks, workers need to be involved in implementing new office technologies and in reallocating staff. With a stake in the system, office workers can deliver productivity gains desired by employers, without contributing to their own demise.

APPENDIX I

Less Optimistic Scenarios for Clerical Employment in the Future

Several researchers have documented the threats to clerical employment. Paul Osterman's careful statistical study of clerk and manager employment following the introduction of mainframe computers across several industries may shed some light on this issue. Briefly, he found that over a six-year period, the substitution of computers for jobs outweighed newly created computer-related jobs, as well as the employment created directly through lower product prices. He estimates that between 1972-1978, every 1% rise in computing power reduced clerical employment by 0.18%. Even though added computer power eventually permits more bureaucratized information management, and thus more paperwork, the "very large" initial displacement was only somewhat offset by new hiring in the more distant future.[233] In addition, the clericals who eventually benefited from subsequent bureaucratic reorganization around the computer were a different group of individuals than those initially displaced.[234]

A number of studies attempt to forecast the future of clerical employment in light of technological advance in the office. Each discounts additional clerical employment from computerization. J. David Roessner, for example, constructs plausible forecasts of clerical jobs in the banking and insurance industries that suppose the speedy introduction and diffusion of "breakthrough technologies" such as artificial intelligence, optical scanning and voice recognition, which will eliminate the human keying in of data or text. To construct his forecasts for clusters of certain clerical jobs sorted by task, he estimates a workload, the number of clericals needed to perform it, and the labor-savings -- the percentage reduction in the workload due to technological advances. Instead of assuming slow diffusion rates for office automation he posits an accelerating rate of introduction. Roessner predicts that up to 40% of the clerical work force in the 1980s in financial services and insurance could be displaced by office automation.[235]

Wassily Leontieff and Faye Duchin explore the potential impact of computer-based technology on jobs given three possible scenarios. One scenario employs optimistic estimates of productivity-enhancement and rapid rates of diffusion to all possible affected workers.[236] Using input-output analysis, they are able to incorporate the interrelationships between 89 separate industries -- how much output from one industry is used in another, how much labor is needed to produce that output. How much spending there will be on a certain industry's output depends on the degree to which technology limits total labor hired in the various industries. They estimate that labor-displacing computer technology (with the extent of displacement based on various case-studies)[237] will be so widely adopted that approximately 8 to 12% less employment will be generated as a result of the technology by the year 2000.

Richard Belous uses Leontief and Duchin's input-output model with the BLS's employment projections to form more moderate estimated impacts of technology on employment. Nonetheless, he projects that clerical employment will be hard hit by technological change -- with employment levels falling over 12% from its 1978 level by the year 2000.[238] Belous distinguishes demand-side from supply-side effects of technology on the quantity of employment. The demand-side effect is to raise real incomes and living standards, as a result of technology-induced productivity gains. This raises spending on goods and services enough to generate a higher demand for labor. The supply-side effect reduces employment, since productivity gains allow firms to produce the same amount of output with less workers. In the past, demand-side effects have apparently been stronger, but the computer and related advanced technologies (artificial intelligence, for example) will produce a stronger supply-side effect than earlier[239] and perhaps lead to actual job losses overall.

Colin Gill predicts that aggregate demand will become weaker in the late 1980s and 1990s, reducing the possible gain in demand for services. If so, demand growth will no longer be able to offset the employment-reducing effects of microelectronics technology.[240]

Even H. Allen Hunt and Timothy L. Hunt accept that clerical job growth in the future will be reduced as a result of computer technology. The real issue is whether clerical jobs will grow roughly at the same pace as output growth in industries such as finance and insurance -- where clerical staffing ratios are high and where technological advances continue to occur rapidly, or, whether job growth will lag behind growth of output from an industry. If it is the latter, even growth in total demand for a relevant industry's good or service will not be able to prevent displacement, nor will it continue to be able to hide dislocation as a result of technology. The key indicator will be if job growth within a certain firm, industry, or sector no longer keeps up with its financial growth.

APPENDIX II

Indirect Employment-Producing Effects of Office Automation: Why These Are Not Significant

One indirect, employment-creating effect of computerization is that it requires workers to manufacture, repair and maintain new equipment. But one must also not ignore the indirect job **loss** involved.[241] Production, repair and maintenance-type jobs connected to the technologies rendered obsolete, such as the typewriter, are eliminated. There is no reason to believe that the latest technologies and computers create more production, maintenance or clerk jobs, on balance, than the technologies becoming outdated.

If computerization or technological advance lowers production costs and reduces product prices, the demand for a company's product or service may expand. The resulting growth in demand for all workers includes demand for clerical workers.[242] The gain in U.S. international competitiveness with reduced production costs also can create more jobs in general, including clerical jobs.[243]

The potential employment created by these two secondary effects of technology is limited, for a variety of reasons. First, improvement in our international competitiveness would not necessarily benefit industries with traditionally high concentrations of clerical workers -- finance, insurance and real estate (FIRE), government, and services -- industries which do not really export a significant share of their output.

In addition, technology may lower costs and prices enough to spur the sales and hence clerical employment of some companies. But more sales in **all** markets won't occur unless there is additional income and spending taking place in the entire economy. In fact, productivity-enhancing technological advances initially create **less** total income, because the first impact is to reduce the amount of labor input used by firms. If all businesses are paying out less for labor, it is more likely that total income and total spending on the part of U.S. consumers will shrink rather than grow.[244] Cheaper costs may allow an individual company to grab a larger share of the market, and therefore increase the number of jobs at that one company. But this merely shifts jobs away from firms which are outcompeted, unless there is more spending overall.

APPENDIX III

Technology, Displacement And Increased Income Inequality

Disparities between wages can widen as an indirect result of new technologies being introduced into the workplace. There are three ways in which the increased pace of technological advance in the office may indirectly generate greater earnings inequality between workers:

1. Technological advance in the office has facilitated the rise of low-paid, marginal jobs.

The generally rising use of part-time and temporary workers in the office is facilitated by office automation -- which allows drastically reduced work time for certain tasks, relatively easier access to stored information, and skills that are transferrable between firms. Part of the inequality in service sector wages stems from the fact that part-time and temporary jobs are becoming more prevalent in a sector that also includes high-paid accountants, consultants and investment bankers.

2. Technological change has helped generate marked changes in the occupational structure, a structure with more disparate wages.

The introduction of computers into workplaces tends to generate higher demand for specialized technical and managerial labor. Because the supply of these types of employees will be fixed for years -- until new labor force entrants can acquire the necessary education and skills -- the wages and salaries of various technical, administrative and managerial employees will be bid up without an accompanying increase in the wages of less skilled workers.

In some industries, office technology is adding jobs at both the high and low end of the wage spectrum at the expense of middle-level jobs.[245] Flatter job hierarchies restrain the potential career paths of clerical workers. A study of new technologies' effect in major Canadian insurance companies found that:

> first-line managers as well as clerical workers have been playing a diminishing role in the Canadian insurance industry. It is in these positions that women have recently made their breakthrough into management, and hence the impact of new technology may be to reduce these opportunities for upward mobility. The study found not only a reduction in the proportion of clerical workers employed but also a widening skill gap that does not bode well for future opportunities.

> During the three-year period that new technology was applied, employment of specialists and professionals increased substantially, however, few of these positions were filled by clerical personnel whose jobs were becoming less in demand.[246]

In short, technology creates a new occupational structure that, in many cases, tends to have a wider variation of incomes attached to it than the structure it replaced.

3. Technological change redistributes income because it erodes labor's bargaining power to capture its share of any profits generated.

When labor-saving technology creates higher productivity, the added profits from sales of a more cheaply produced product or service have a way of filtering more toward managers (through bonuses and profit-sharing, for example) and shareholders than to a firm's hourly employees. Technological progress can thus reduce labor's relative "share" of income and raise inequality.[247]

Unions forced to concentrate on maintaining jobs and job security have been unable to recapture a share of technologically generated profits. In fact, through much of the 1980s labor has been forced to accept substantial wage concessions or wage gains below the rate of inflation. As a result, union wages have been driven down toward the wages of nonunion labor, with no comparable shift downward at the high-wage end of the spectrum, and inequality in earnings has worsened.

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144. Klima, op. cit.

145. Interview with Chet Osinski, EDI Operations Analyst, Conrail; November 1987.

146. Menth, op. cit.

147. Osinski, op cit.

148. Ibid.

149. Interview with Terry Hayes, Terminal Manager, Jones Transfer; November 1987.

150. Interview with Fred Mills, Project Consultant, Santa Fe Railroad; November 1987.

151. Ibid.

152. Ibid.

153. Interview with Ray Cully, Manager of Commercial Services, LTV Steel; November 19, 1987.

154. Interview with Terry Hayes, op. cit.

155. ComputerTalk, Vol.5, No.2, Fall 1987, p. 36.

156. "Cash Flow for Pharmacy," General Computer Corp. Brochure, 1987.

157. Interview with Dick Wheeler, Manager of Electronic Claims, Blue Cross/Blue Shield of Toledo; November 1987.

158. Interview with Bill Parsons, Manager of Electronic Claims, Blue Cross/Blue Shield of Cleveland; November, 1987.

159. Interview with Margaret Hayes, Business Office Manager, St. Luke's Radiology; November 1987.

160. Interview with Wendy Golenberke, formerly business manager of a Cleveland radiology office, now marketing representative for Information Access; November 1987.

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162. "Plug in to CashFlow," General Computer Corp. brochure, 1987.

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164. Hayes, op. cit.

165. Parsons, op. cit.

166. Hayes, op. cit.

167. Parsons, op. cit.

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169. American Medical News, April 24, 1987.

170. Ibid.

171. Parsons, op. cit.

172. Ibid.

173. Ibid.

174. Ibid.

175. Interview with a marketing representative who wished to remain anonymous, Medical Payment Systems; November 1987.

176. Schindler et al, op. cit.

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178. Ibid.

179. Interview with Rose Hayden-Smith, Public Relations Manager, McDonnell Douglas Information Systems; November 1987.

180. Interview with Patricia Flynn, October 1, 1987, based on information from her study, 1987, op. cit.

181. Jerome Mark, "Technological Change and Employment: Some Results from Bureau of Labor Statistics Research," Monthly Labor Review, April 1987, pp. 28-29.

182. Albert R. Karr, "AFL-CIO Says Plant-Closing Law Covers Only 2% of Firms but 50% of Workforce," Wall Street Journal, August 4, 1988.

183. Interview with Wilma J. Connelly, former data entry agent for Emery Worldwide, who was laid off in October of 1987 after 11 1/2 years of service.

184. Choate, op. cit., p. 223.

185. See Hamermesh, op. cit., p. 72. Hamermesh proposes to require provision of information regarding impending plant closings well before the 60 days now required by law. Unemployment insurance, once a major protection, now covers barely more than one in four unemployed workers.

186. Johnston, op. cit., p. 37.

187. Michael Pollack, "Business is Dragging its Feet on Retraining," Business Week, September 29, 1986.

188. Ibid., p. 73.

189. Thomas J. Hague, "Training More Skilled Workers," Wall Street Journal, October 12, 1987.

190. "Training Magazine Industry Report," Training, October 1984.

191. Max Carey and Alan Eck, "How Workers Get Their Training," Occupational Outlook Quarterly, Vol. 28, Winter 1984.

192. Estimates vary widely on these training costs. An estimate in 1979 put this cost at about $2000 per office worker.

193. As quoted in Bureau of National Affairs, White Collar Report, April 1, 1987, p. 311.

194. Thierry Noyelle, "Services and the New Economy: Towards a New Labor Market Segmentation," January, 1987, pp. 15-16.

195. "Back to the Basics," Newsweek, September 21, 1987, p. 54.

196. "Franchising Education," Nation's Business, April, 1987, pp. 30-31.

197. Based on a U.S. General Accounting Office report, March, 1987. The high job placement rate of JTPA participants is at least partly due to the fact that harder-to-place displaced workers are ignored, such as lower-educated and older workers (who make up 55% of the displaced but only 8% of program participants). See "Training Program Boosts Placement," Cleveland Plain Dealer, March 10, 1987, and "Job Training Effort, Critics Say, Fails Many Who Need Help Most," The Wall Street Journal, February 9, 1987.

198. 9to5, Ohio's Clerical Workers, p. 50.

199. Choate, op. cit., p. 217.

200. Ibid.

201. See Paul E. Barton, A Better Fit Between Unemployment Insurance and Retraining, National Institute for Work and Learning, 1986, pp. 37-40.

202. Ibid., pp. 5-12.

203. See Ibid., pp. 34-36.

204. Cyert & Mowery, eds., Technology and Employment, p. 8.

205. Esparza, op. cit., p. 59.

206. Daniel Cornfield, Workers, Managers, and Technological Change, Plenum, 1987, p. 11, quoting from Samuel Gompers autobiography, Seventy Years of Life and Labor, E.P. Dutton, 1925, p. 47, 373.

207. Ibid., p. 15.

208. Ibid., p. 17, citing data from the Bureau of Labor Statistics, Major Collective Bargaining Agreements.

209. Ibid.

210. Ibid., p. 18, citing Bureau of Labor Statistics' data from Selected Earnings and Demographic Characteristics of Union Members.

211. Philip M. Doyle,"Area Wage Surveys Shed Light on Declines in Unionization," Monthly Labor Review, September 1985, p. 16, Table 3.

212. Daniel Marschall, "Tackling the Issues of Tomorrow," special report for the AFL-CIO's Department for Professional Employees' "Here Comes Tomorrow" Conference, 1987.

213. Ibid., p. 19.

214. Information based on phone interviews with Seth Rosen of CWA Local 4309, in Cleveland, September 10 and November 24, 1987 and October 17, 1988.

215. Ibid.

216. Ibid.

217. Ibid.

218. See Solomon, op. cit.

219. John Halusha, "Auto Job Guarantees Sought," New York Times, July 7, 1987.

220. Bureau of National Affairs, White-Collar Report, October 1, 1986, p. 341.

221. Ibid.

222. Marcy Kaptur, "Companies' Education Investment Pays High Dividends," Wall Street Journal, October 27, 1987.

223. Ibid.

224. Choate, op. cit., p. 212.

225. Ibid., p. 211.

226. Ibid., p. 213.

227. Ibid., p. 214.

228. 9to5, Ohio's Clerical Workers, p. 65.

229. Choate, op. cit., p. 215.

230. Ibid., p. 224.

231. 9to5, Ohio's Clerical Workers, p. 44.

232. Ibid.

233. Paul Osterman, "White-Collar Employment," in Thomas Kochan, Challenges and Choices Facing American Labor, MIT, 1985, p. 181.

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234. Osterman, 1986, op, cit., p. 184.

235. Roessner, op. cit.

236. Wassily Leontief and Faye Duchin, The Future Impact of Automation on Workers, Oxford, 1986.

237. Ibid., p. 95.

238. Richard Belous,"Technological Change and Its Effects on Labor Markets," Labor Law Journal, August, 1986.

239. Ibid.

240. Colin Gill, Work, Unemployment and the New Technology, Cambridge, Great Britain, 1985.

241. Brady and Liff, op. cit., p. 382.

242. The NAS attaches considerable weight to this indirect effect of technology as a source of potential clerical job gain.

243. This is a view shared by Choate, op. cit., Groshen, op. cit., and Richard Belous and Andrew Wyckoff, "Trade Has Winners, Too," Across the Board, September 1987.

244. Assuming that employment in the entire economy will behave exactly like it does in one particular firm or market commits the so-called "fallacy of composition", erroneously assuming that what may be true at the "micro" level is also true at the macro level. There is simply no reason to believe that businesses and individuals will decide to spend a **greater proportion** of their incomes simply because products and services are somewhat cheaper because of technological advance. In the language of economic theory, whether the total demand for goods and services expands, on balance, with technology-driven productivity gains depends on the dimensions of "price-elasticity" -- which determines how much more demand will grow with a price drop, versus "income-elasticity" -- how much **less** demand there will be because of a general drop in consumer incomes.

245. See Osterman, "Technology and White-Collar Employment," p. 54.

246. Werneke, op. cit., p. 411.

247. Costrell, 1987, shares the view that if technology has a labor-saving "bias" it will reduce labor's portion of national income.